

The Awareness and Practices of Foot Care in Adult Diabetic Patients Attending University Hospital

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Abstract

Aim: To determine the awareness and practices of foot care in adult diabetic patients attending Dow university hospital OJHA Campus Karachi, Pakistan.

Methodology: This is an observational study was conducted at National Institute of Diabetes and Endocrinology and department of medicine Dow University Hospital, Ojha Campus, Karachi, from October 2015 to December 2015. All demographic data was collected from every diabetic patient like age (years), gender, education level and details of disease and treatment, like age at first diagnosis of diabetes, duration of DM in years, medication and glycaemic control among the study participants. The awareness of diabetic foot care in diabetic patients was assessed by questionnaire. Data was entered and analyzed by using SPSS version 19.

Results: Among 384 patients, 186 (48.4%) were males while 198 were females (51.6%). Between ages 22- 40 were 77 patients, 41 to 60 were 245 patients and 61 to 80 were 62 patients. Mean age of individuals were 50.56+10.60. A total of 78.64% (n=302) of patients had Type 2 Diabetes Mellitus, 14.58% (n=58) had Type 1 Diabetes Mellitus while 6.77% (n=26) had gestational diabetes mellitus. 35.7% (n=210) had coexisting hypertension. 126 had history of foot ulcers while 137 had history of amputation. Questions were asked regarding treatment options for diabetes and their awareness and habits about foot care.

Conclusion: Regular assessment and emphasis on foot care could reduce the incidence of diabetes related foot problems bringing an era of reduced health care burden of diabetes related issues.

Keywords: Foot care; Diabetes mellitus; Knowledge

Introduction

Diabetic foot can be defined as full thickness foot ulcer below the ankle in a patient with diabetes, irrespective of the duration of ulcer. Diabetes is the leading cause for non-traumatic lower extremity amputation. Half of these amputations are of toes or foot while the other half are at transtibial or transfemoral level [1-3].

Foot ulcerations are invitation for infection which can further deteriorate into gangrene and osteomyelitis leading to amputation [4-6]. Foot ulceration is also the most common cause of in-hospital stay among patients with diabetes [7]. The most common site for development of foot ulcers is planter surface of fore foot [8]. Life time risk for development of foot ulcers in diabetics is 15% to 25% but it could be decreased if effective measures in the right direction are taken [9-11]. Major risk factors for development of foot problems in diabetics include increased age, diabetes for longer than 10 years, poor glycemic control, cigarette smoking, history of previous foot ulcers or amputations, high planter foot pressure and no concern for foot care. Co-existing conditions like peripheral neuropathy with loss of protective sensation (protective sensation is defined as the degree of neuropathy beyond which the patient is at high risk for diabetic foot ulceration), bone deformities, peripheral vascular disease, nail pathologies can further increase the risk [12-14].

The pathophysiology behind the high risk of ulceration, gangrene and amputation in diabetics can be defined by impairment of intrinsic wound healing mechanisms, impaired collagen cross linking and dysfunctions of immunologic cells including polymorphonuclear leukocytes [15,16].

Researchers have recommended annual foot examination for all patient with diabetes [17-19] which should include assessment of protective sensation, any bone, skin or nail deformity, elevated planter response and peripheral vascular disease. An abnormal ankle brachial index (ABI) and difference of temperature in both feet can point towards ongoing peripheral vascular disease. If there are any ulcers, detailed history should be taken to look for their underlying pathology [20]. Most of diabetics have vision issues and other physical disabilities which can hinder self care. Such patients require much detailed and frequent health care assessment because they themselves may not notice any changes in sensations or development of ulcers [21]. Peripheral sensory neuropathies are the strongest risk factor in the development of diabetic foot [22,23]. Vibration perception thresholds (VPTs) are used for measuring loss of protective sensation. They could be measured easily using biothesiometer. VPT of >25V have seven fold greater risk of foot ulcers compare with VPT of less than 15V. If biothesiometer is not available, tuning fork can also be used [24]. So our aim was to assess the awareness of foot care and their practices in diabetic peoples which would help us in developing of a program in which People with diabetes would be involved and guide them for self-

care and good practice of looking their feet, avoiding of developing a complication, and the care they should get from the health service.

Subjects and Methods

National Institute of Diabetes and Endocrinology and medicine department of Dow University Hospital, Ojha Campus, Karachi, from October 2015 to December 2015. Sample size: Using open Epi sample size calculator with prevalence P=50%, at 5% margin of error and 95% CI, the minimum participants required for the study is, n=384.

All the diabetic patients attending the diabetes clinic or medical OPD and who give consent were included. All demographic data was collected from every one patient like age (years), gender, education level and details of disease and treatment among the study participants such as age at first diagnosis of diabetes, duration of DM in years, medication and glycaemic control. The awareness of diabetic foot care in diabetic patients was assessed by questionnaire. Data will be entered and analyzed on SPSS version [19]. Mean and SD will be calculated for quantitative variables and frequency and percentages will be calculated for qualitative variables. Chi-square test was used to compare the categorical data. P value of <0.05 was considered significant.

Results

Among 384 patients, 186 (48.4%) were males while 198 were females (51.6%).

| Variable | No. Patients | Percentage |
|-------------------------------|--------------|------------|
| Gender | | |
| Male | 186 | 48.4% |
| Female | 198 | 51.6% |
| Age | | |
| 22-40 years | 77 | 20.05% |
| 41-60 years | 245 | 63.80% |
| 61-80 years | 62 | 16.14% |
| Diabetes Mellitus | | |
| Type 1 Diabetes Mellitus | 58 | 15.10% |
| Type 2 Diabetes Mellitus | 302 | 78.64% |
| Gestational diabetes mellitus | 24 | 6.25% |
| Educational status | | |
| Uneducated | 229 | 59.63% |
| Matriculation | 67 | 17.44% |
| Intermediate | 39 | 10.15% |
| Graduates | 21 | 5.46% |
| Post graduates | 28 | 7.29% |

Table 1: Demographics variable of patient.

Between ages 22- 40 were 77 patients, 41 to 60 were 245 patients and 61 to 80 were 62 patients. Mean age of individuals were

50.56±10.60. 78.64% (n=302) of patients had Type 2 Diabetes Mellitus, 15.10% (n=58) had Type 1 Diabetes Mellitus while 6.25% (n=24) had gestational diabetes mellitus. 54.68% (n=210) had co-existing hypertension. Educational status of patients was evaluated. Majority of them were uneducated (n=229). 67 had passed matriculation, 39 had passed intermediate examinations, 21 were graduates while 28 were post graduates (Table 1).

Mean BMI of patients was found to be 20.07±4.82. 20.57% of patients were smokers. 126 had history of foot ulcers while 137 had history of amputation (Table 2).

| History | Total number of patients | Smokers | P-value |
|---|--------------------------|---------|---------|
| Previous history positive for amputations | 79 | 26 | <0.001 |
| Previous history positive for foot ulceration | 79 | 39 | <0.001 |

Table 2: Association of smoking with previous history of amputation and foot ulcers.

Questions were asked regarding treatment options for diabetes and their awareness and habits about foot care (Tables 3 and 4). Responses to these questions are shown in the following tables.

| S.No | Questions | Yes (%) | No (%) | Mean | Std Deviation |
|------|--|-------------|-------------|--------|---------------|
| 1 | Avoid walking bare foot | 336(87.5%) | 48(12.5%) | 1.1227 | 0.32854 |
| 2 | Washing and drying feet daily | 378(98.4%) | 6(1.56%) | 1.0157 | 0.12434 |
| 3 | Check feet daily | 314(81.77%) | 70(18.22%) | 1.1828 | 0.38698 |
| 4 | Check shoes daily | 315(82.03%) | 69(17.96%) | 1.1802 | 0.38482 |
| 5 | Avoid injuries | 182(47.39%) | 202(52.60) | 1.5248 | 0.50004 |
| 6 | Clip` toe mils | 187(48.69%) | 197(51.30%) | 1.5144 | 0.50045 |
| 7 | Examine toe spaces daily | 183(47.65%) | 201(52.34%) | 1.5248 | 0.50004 |
| 8 | Use of oil/ Moisturizes Daily | 336(87.5%) | 48(12.5%) | 1.1253 | 0.33152 |
| 9 | Diabetes could cause reduce foot sensation | 248(64.58%) | 138(35.93%) | 1.3551 | 0.47917 |
| 10 | Can diabetes effect many organs in body | 186(48.43%) | 198(51.56%) | 1.5170 | 0.50037 |

Table 3: Awareness Questions.

Discussion

Researchers have recommended that the most effective action for reducing the rate for lower extremity amputation among diabetics is to organize regular awareness and screening campaigns [25,26]. Studies have reported that 40-85% of amputations can be prevented [20]. Lavery

et al. reported 47.4% decrease in incidence of amputations by organizing a disease management program which consisted of screening and treatment of diabetic problems [4]. In our study only 13.8% of diabetics had their foot examined by doctors and 7.8% of patients preferred podiatrists. Being a developing country, education is still in its initial phase of growth but indeed it is our responsibility to raise knowledge among people regarding their self care so that the social and economic health burden could be reduced. 52.6% of diabetics from our study claimed that they don't avoid injuries while routine activities. 35.4% patients had no idea that diabetes could reduce foot sensation while 70% of patients don't check their feet daily. These responses point towards immense need of awareness campaigns in our locality.

| Questions | Yes (%) | No (%) | Mean | Std Deviation |
|-----------------------------|-------------|-------------|--------|---------------|
| On oral Medicine | 354(92.18%) | 30(7.8%) | 1.72 | 1.49 |
| On insulin | 114(29.68%) | 270(70.3%) | 1.60 | 2.38 |
| Dietary Education | 240(62.5%) | 144(37.5%) | 1.3760 | 0.48501 |
| Exercise | 179(46.6%) | 205(53.38%) | 1.5326 | 0.49959 |
| Self- Monitoring of Glucose | 189(49.2%) | 195(50.78%) | 1.5091 | 0.50057 |
| Foot Care Education | 98(25.5%) | 286(74.47%) | 1.7467 | 0.43545 |
| Feet Examined by Podiatrist | 30(7.8%) | 354(92.18%) | 1.9217 | 0.26904 |
| Feet Examined By Doctors | 53(13.8%) | 331(86.2%) | 1.8642 | 0.34299 |

Table 4: Treatment of Diabetes Mellitus

Females are at lower risk for diabetes related amputations. This fact can be explained by a number of factors like having a much lighter life style, most of them being non-smokers, hormonal differences from males, much lower severity of vascular disease in them and also concern for foot care [21]. In our study majority of diabetics presenting in OPD were females. Females were found to be more concerned regarding foot care. In our study of 378 patients who regularly washed and dried their feet, 195(50.78%) were females, of 374 patients who checked feet daily 164(42.70%) were females, of 182 patients who avoid injuries 85(46.7%) were females, of 336 patients who regularly use oil and moisturizers 182 (54.1%) were females.

Strict glycemic control is must. Diabetic complication and control trial have reported 57% reduction in neuropathy in patients on strict glycemic control compared to those with conventional glycemic control [22]. Exercise can help in effectively reducing blood sugar levels along with using subcutaneous insulin [23]. 53.4% of diabetics from our study don't exercise and 50.8% patients don't monitor blood glucose daily. These patients are at much higher risk of developing diabetic complications later in life.

One big time role in diabetic foot care is played by foot wear. While screening for foot deformities, patient's foot wear should also be assessed whether it is appropriate for their foot size and shape. It should not be too narrow or too tight. Also the base should be comforting so that the planter surface is not exposed to excessive pressure. Shoe inserts should reduce areas of high planter pressure.

High planter foot pressures can result in repetitive trauma even while normal walking. If the pressure is reduced, it requires more cycles for trauma. Young et al have found through his research that if the peak foot pressure is reduced to less than 112N/cm², the chances for foot ulceration are minimal [24]. In majority of clinical scenarios, shoe related trauma in association with loss of protective sensation is the trigger for foot ulceration. Patients with foot deformities and clinical neuropathy should opt for custom fitted shoes. Some foot deformities include hallux valgus, hammer toes, restricted range of motion of foot joints [25]. More studies on foot wear for diabetics is required which should evaluate that using which type of materials in foot wear are most effective in reducing the incidence of ulceration in patients. 18% of diabetics from our study don't check their shoes daily for any wear or tear.

Researchers have reported direct association between tobacco use and foot ulcers and amputations. Smoking could aggravate ongoing atherosclerotic process and contribute in lowering blood supply [26,27]. In our study 34% (n=26) of patients with prior amputations and 49.3% (n=39) of those with prior history of foot ulcers are smokers. These patients are at high risk for recurrent ulceration (Table 2).

Management of diabetic foot wounds require multidisciplinary approach. Mild ulcerations can be treated as out-patient while serious patients require hospital admission. Both mild and serious wounds require close monitoring. Broad spectrum antibiotics should be started as early as possible. Many patients may not show systemic signs and symptoms because of diabetes related immunosuppressant however some patients may show systemic signs such as fever with or without chills and malaise. Wound infection with systemic signs should be considered serious. Limb threatening signs of diabetic foot include cellulitis of greater than 2 cm, lymphangitis, odour from wound, edema, ischemic changes and signs of systemic toxicity. Hospital admission should be considered and if the wound fails to heal, foot sparing reconstructive procedures should be addressed [27-33].

Conclusion

Regular assessment and emphasis on foot care could reduce the incidence of diabetes related foot problems bringing an era of reduced health care burden of diabetes related issues. Patients with high risk foot problems should be assessed more frequently. The most beneficial step in reducing risk of diabetes related foot problems is to provide patients with education regarding self care. Screening for loss of protective neuropathy further reduces the risk. Our study has demonstrated that our population lacks self care education. Awareness and screening campaigns would prove to be highly beneficial and will reduce the rate of amputations in near future.

References

1. "Diabetes" (2014) World Health Organization. WHO 2: 15-19.
2. Mayfield JA, Reiber GE, Sanders LJ, Janisse D, Pogach LM (1998) Preventive foot care in people with diabetes. *Diabetes Care* 21: 2161-2177.
3. Dikeukwu RA, Omole OB (2013) Awareness and practices of foot self-care in patients with diabetes at Dr Yusuf Dadoo district hospital, Johannesburg. *JEMDSA* 18: 112-118.
4. Lombard C, Lambert EV (2013) "Diabetes Fact sheet". WHO 13: 15-22.
5. Al-Wahbi AM (2010) Impact of a diabetic foot care education program on lower limb amputation rate. *Vasc Health Risk Manag* 6: 923-934.

6. Peer N, Steyn K, Lombard C, Lambert EV, Vythilingum B, et al. (2012) Rising diabetes prevalence among urban-dwelling black South Africans. *PLoS One* 7: e43336.
7. Williams textbook of endocrinology (2001) Philadelphia: Elsevier/Saunders 15: 1371-1435.
8. "International Diabetes Foundation: Diabetes Atlas".
9. Reiber GE (1996) The epidemiology of diabetic foot problems. *Diabet Med* 1: S6-11.
10. Boulton AJ, Armstrong DG, Albert SF, Frykberg RG, Hellman R, et al. (2012) Comprehensive foot examination and risk assessment a report of the task force of the foot care interest group of the American diabetes association, with endorsement by the American association of clinical endocrinologists. *Diabetes care* 31: 1679-1685.
11. Iqbal T, Rashid F, Saleem SA, Shah SA, Khalid GH, et al. (2013) Awareness about Diabetes Mellitus Amongst Diabetics. *Journal of Rawalpindi Medical College (JRMCC)* 17: 294-296.
12. Mayfield JA, Reiber GE, Sanders LJ, Janisse D, Pogach LM (2004) American Diabetes Association preventive foot care in diabetes. *Diabetes Care* 27: S63-64.
13. Chellan G, Srikumar S, Varma AK, Mangalanandan TS, Sundaram KR, et al. (2012) Foot care practice - the key to prevent diabetic foot ulcers in India. *Foot (Edinb)* 22: 298-302.
14. McInnes A, Jeffcoate W, Vileikyte L, Game F, Lucas K, et al. (2011) Foot care education in patients with diabetes at low risk of complications: a consensus statement. *Diabet Med* 28: 162-167.
15. American Diabetes Association (1999) Consensus Development Conference on Diabetic Foot Wound Care. *Diabetes Care* 22: 1354.
16. Lobmann R, Ambrosch A, Schultz G, Waldmann K, Schiweck S, et al. (2002) Expression of matrix-metalloproteinases and their inhibitors in the wounds of diabetic and non-diabetic patients. *Diabetologia* 45: 1011-1016.
17. American Diabetes Association (2004) Preventative foot care in people with diabetes. *Diabetes Care* 27: S31-S32.
18. Sinharay K, Paul UK, Bhattacharyya AK, Pal SK (2012) Prevalence of diabetic foot ulcers in newly diagnosed diabetes mellitus patients. *J Indian Med Assoc* 110: 608-611.
19. Olson JM, Hogan MT, Pogach LM, Rajan M, Raugi GJ, et al. (2009) Foot care education and self management behaviors in diverse veterans with diabetes. *Patient Prefer Adherence* 3: 45-50.
20. Lavery LA, Armstrong DG, Vela SA, Quebedeaux TL, Fleischli JG (1998) Practical criteria for screening patients at high risk for diabetic foot ulceration. *Arch Intern Med* 158: 157-162.
21. George H, Rakesh PS, Krishna M (2013) Foot Care Knowledge and Practices and the Prevalence of Peripheral Neuropathy Among People with Diabetes Attending a Secondary Care Rural Hospital in Southern India. *J Family Med Prim Care* 2: 27-32.
22. Young MJ, Breddy JL, Veves A, Boulton AJ (1994) The prediction of diabetic neuropathic foot ulceration using vibration perception thresholds: a prospective study. *Diabetes care* 17: 557-560.
23. Schmidt S, Mayer H, Panfil EM (2008) Diabetes foot self-care practices in the German population. *J Clin Nurs* 17: 2920-2926.
24. Bowker JH, Pfeifer MA, Reiber GE (2001) Epidemiology of foot ulcers and amputations in the diabetic foot. *The Diabetic Foot* 21: 13-32.
25. Lacle A, Valero-Juan LF (2012) Diabetes-related lower-extremity amputation incidence and risk factors: a prospective seven-year study in Costa Rica. *Rev Panam Salud Publica* 32: 192-198.
26. The Diabetes Control and Complications Trial Research Group (1999) The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329: 977-986
27. Chandalia HB, Singh D, Kapoor V, Chandalia SH, Lamba PS (2008) Footwear and foot care knowledge as risk factors for foot problems in Indian diabetics. *Int J Diabetes Dev Ctries* 28: 109-113.
28. Lipsky BA, Berendt AR, Deery HG, Embil JM, Joseph WS, et al. (2004) Diagnosis and treatment of diabetic foot infections. *Clinical infectious diseases* 39: 885-910.
29. Vashist SK (2013) Continuous Glucose Monitoring Systems: A Review. *Diagnosics (Basel)* 3: 385-412.
30. Frykberg RG, Armstrong DG, Giurini J, Annemarie EDP, Kravette MDP, et al. (2000) Diabetic foot disorders. A clinical practice guideline: for the American collage of foot and ankle surgeons and the American collage of foot and ankle orthopedic and medicine. *Am Acad Orthop Surg* 39: 1-60.
31. Moser EG, Morris AA, Garg SK (2012) Emerging diabetes therapies and technologies. *Diabetes Res Clin Pract* 97: 16-26.
32. Chen CE, Ko JY, Fong CY, Juhn RJ (2010) Treatment of diabetic foot infection with hyperbaric oxygen therapy. *Foot Ankle Surg* 16: 91-95.
33. Hobizal KB, Wukich DK (2012) Diabetic foot infections: current concept review. *Diabet Foot Ankle* 3: 1-8.
- 34.