



---

## Knowledge, practice and complications associated with diabetic foot

Fakhsheena Anjum, Sana Ghayas\*, Noor Jahan, Hina Yasin, M. Ali Masood

Dow College of Pharmacy, Dow University of Health Sciences, Karachi, Pakistan

Received: 17-05-2015 / Revised: 23-06-2015 / Accepted: 28-06-2015

---

### ABSTRACT

The patients with diabetes mellitus are at a higher risk of developing foot ulcers, cardiovascular disorders or a neuropathy that may be the reason for amputations. Such illnesses already exist in some of the diabetic patients at the time of diagnosis. To determine the knowledge and complications associated with the diabetes in Type II diabetic patients, a non-interventional, descriptive study was conducted at different OPD clinics in Karachi from November 2014 to February 2015. The data was collected through a self-administered questionnaire from Type II diabetic patients and then assessed using SPSS version 16.0 by applying suitable statistics. There were 44.9% male and 55.1% female Type II diabetic patients included in this study (n=118). Regarding the educational qualification, 45.8% patients were illiterate/primary education and 36.4% had secondary/intermediate education. The patients had age range of 47 to 67 years and the range of duration of their illness was 3 to 18 years. About 33% patients were smokers and 49.2% had family history of diabetes mellitus. It was found that 75.4% patients never received any education regarding their foot care and 41.5% patients practiced their foot care (i.e. 37.75% males and 44.6% females) regularly. Chief complications related to diabetes in the patients were hypertension, neuropathy and cardiovascular variations (43.2%). Almost 65% patients were receiving oral hypoglycemic and about 36% of the patients were advised to have specific diet with oral hypoglycemic agents. The level of awareness regarding complications associated with diabetes mellitus was not satisfactory among patients and hence the deficiency of proper diabetic foot care might lead to greater rates of amputations and diabetes related complications.

**Key words:** Type II diabetes, diabetic foot care, diabetic complications, neuropathy and cardiovascular disorders.



### INTRODUCTION:

The diabetic foot is a worldwide danger and is a major cause of morbidity and mortality in diabetic patients [1-3]. The probable number of mortalities due to diabetes is parallel to the collective number of deaths from various infectious diseases such as HIV/AIDS, malaria, and tuberculosis [4]. There were 366 million estimated people who were found diabetic in 2011. It is probable that in 2030, the expected prevalence of diabetes will be 366 million and around 530 million people may become diabetic [5].

Diabetic foot is considered as one of the most debilitating chronic problems arising from poor disease management. In the developing and developed countries, it has both social and economic influence on families, health system, and entire society [6]. Previous studies have shown that only 10-19% of hospitalized diabetic patients had

their feet observed after footwear and socks were taken off [7]. Nevertheless, it is well-recognized that most of diabetic foot complications can be prevented with focused, specialized care [6]. Diabetic foot complications are one of the main reasons of amputation in the patients and consequent physical and emotional hitches. Foot ulcers may arise due to the disorders of peripheral vessels and nerves, and foot gangrene can be caused by superadded infection. This problem leads to the admission of diabetic patients to hospital, and hence leads to very high medical expenses globally [8-9]. The loss of sensation in the feet is due to peripheral neuropathy due to which a patient fails to notice foot complications. This may progress to foot deformities that increase pressure points liable to ulceration. Risk factors for amputation include increased age, male sex, or a member of specific racial/ethnic groups, having reduced glycemic control, having prolonged diabetes disease and practicing or getting meager

defensive health care [10]. Morbidity and mortality due to type II diabetes mellitus can be reduced by secondary prevention using systematic screening, timely detection of the disease and its complications, and proper management of chronic problems. To control diabetes mellitus, it is essential to define related risk factors. Manageable risk factors associated with diabetes include obesity [11], hypertension [12], dyslipidemia [13] and smoking [14]. Even though the risk factors are well established, a great percentage of patients cannot escape risk factors for diabetes-related disabilities [15]. So, developments in disease controlling and monitoring are necessary to warrant that standard objectives are achieved [16].

Diabetic foot complications were initially recognized by the diabetologists in 1980 in the UK and in 1990 in other European countries plus Holland. In 2005, International Diabetic Federation also selected the theme of "Put Feet First, Prevent Amputations" of World Diabetes Day identifying the status of diabetic foot complications. In 2002, the diabetic foot care program was activated at King Abdul Aziz Medical City in Riyadh, thus effectively decreasing the cost to patients, society, and the health care system [17]. In one study done in Shifa International Hospital, Islamabad, Pakistan it was reported that the awareness about diabetes mellitus in majority of diabetic patients was poor [18]. It was also reported that in Pakistan there is deficiency of competent and skilled diabetes mentors or organized diabetes education programs and services. There are no well-established diabetic foot care clinics due to which patients with diabetic foot ulcers are referred to medical, surgical or orthopedic wards with none prepared to own them [18]. In a study done in Lebanon to assess the quality of care delivered to diabetic patients by their family physicians, it was observed that the physicians had poorly documented patient guidelines on diet, exercise, foot care, and diabetes self-care. Therefore, it is necessary to know the level of understanding of diabetic patients about the avoidance of foot ulcers and complications of the disease so as to recommend interventional strategies [19].

## METHODOLOGY

This cross sectional, descriptive study was conducted at various OPD clinics in Karachi from October to December 2014. The patients included were having recognized Type II diabetes mellitus. The data was collected on self-administered questionnaire by the researchers and was assessed using SPSS version 16.0 by applying appropriate statistics.

## RESULTS AND DISCUSSION

There were total n=118 patients with Type II diabetes mellitus in this study (44.9% males, 55.1% females). Other studies have also shown similar percentages of age and gender presenting a prevalence of disease more in the women [20-21]. From figure 1, it can be observed that almost 50% diabetic patients were illiterate or with primary education. It is hard for the patients with low level of education to have access to disease information and it is also harder for them to realize multifaceted disease mechanisms and managements provided, consequently confining their chances for attaining information about health care [22]. In 2007, Khamesh and coworkers also reported that illiterate patients had minimum knowledge about foot care practices [23]. A study done on 100 diabetic patients in Pakistan established that deficiency of knowledge, reduced glycemic control and length of disease were the chief reasons leading to diabetic foot complications [17].

Around 40% diabetic patients were obese and almost 25% were underweight in this study. Previous studies [24-25] have shown a direct association between body mass index and increasing incidence of diabetes which might be due to socio-cultural and lifestyle modifications i.e. increased fast food intake, modifications in the routine due to urbanization [26]. It was found in this study that almost 33% patients were smokers and approximately 50% had family history of diabetes. An association between diabetes and current smoking had been discovered in 2002 and smoking was regarded as an independent modifiable risk factor for type II diabetes mellitus. Extensive campaigns for reducing smoking among all age groups should be targeted to reduce the incidence of the disease [27]. Some studies have also reported the association between diabetes mellitus and non-modifiable risk factors like age, gender, and a family history of diabetes [28-30].

It was observed in our study that about 75% patients never received any education regarding diabetic foot care; almost 42% patients regularly practiced their foot care among which 37.75% were males and 44.6% females (Table). A study done by Murtaza Gondal et al on 100 diabetic patients in multiple hospitals in Rawalpindi, Pakistan, revealed that only 34% patients examined their feet daily [31]. Another study conducted in Iran on 100 diabetic patients showed that 60% diabetic patients failed to examine their feet and 62% used to walk bare feet in spite of having the disease [23]. A study in 2002 on 61 diabetic patients was done to evaluate their foot care practices. Despite of having education on foot care, the patients were using

inappropriate or no foot care measures. Inappropriate foot care was obvious in patients who already had foot ulcers and also in those who were at high risk [32]. According to Professor Karell Baker only 14% of physicians treating diabetic patients, inspect their feet [18]. To accomplish the targets of diabetes education, patients should be stimulated to have a positive approach towards self-care and they must modify old lifestyles [33].

Almost 65% diabetic patients enrolled in this study were taking oral hypoglycemic agents and around 36% were advised to have particular diet with oral hypoglycemic agents to treat their disease (Table). These findings are supported in the literature that showed that 68.5% of diabetic patients used oral medication and 31.5% used insulin for their illness [34]. Main diabetic complications in the diabetics in our study found were hypertension, neuropathy, cardiovascular changes and retinopathy as shown in figure 2. Diabetic neuropathy has been reported as a chief cause for the growth of lower limb ulcers affecting 50% of all diabetic patients over 60 years of age in the earlier studies. The disorder may be there before the loss of protective sensitivity hence making the patients more liable to trauma, posing a 7-fold greater risk of ulcers [35]. Lower limb

disorders like diabetic neuropathy, peripheral vascular disease, ulcers, and limb amputations are reported to be observed twice as much in the diabetic patients as compared to non-diabetic patients affecting 30% of patients with age 40 years or more [36]. A previous study revealed that 20 years of diabetes carry great risk for peripheral vascular disease hence it is essential to detect risk factors for this illness [37]. Our finding of an increased prevalence of hypertension in diabetic persons is similar to those reported in other studies [13, 28, 38]. It is known that although both hypertension and diabetes may happen independently, yet they are identified to intensify each other [38].

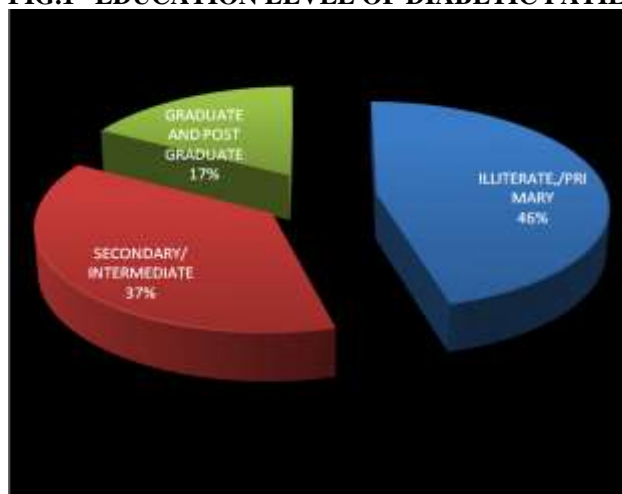
**CONCLUSION**

The recommendations for satisfactory prevention and intervention regarding diabetes mellitus include detection of various risk factors like diabetic neuropathy, peripheral vascular disease, and structural foot deformities. Health care providers should include diabetic patients in all phases of the education process; patients should also extend their particular information and improve skills for self-care.

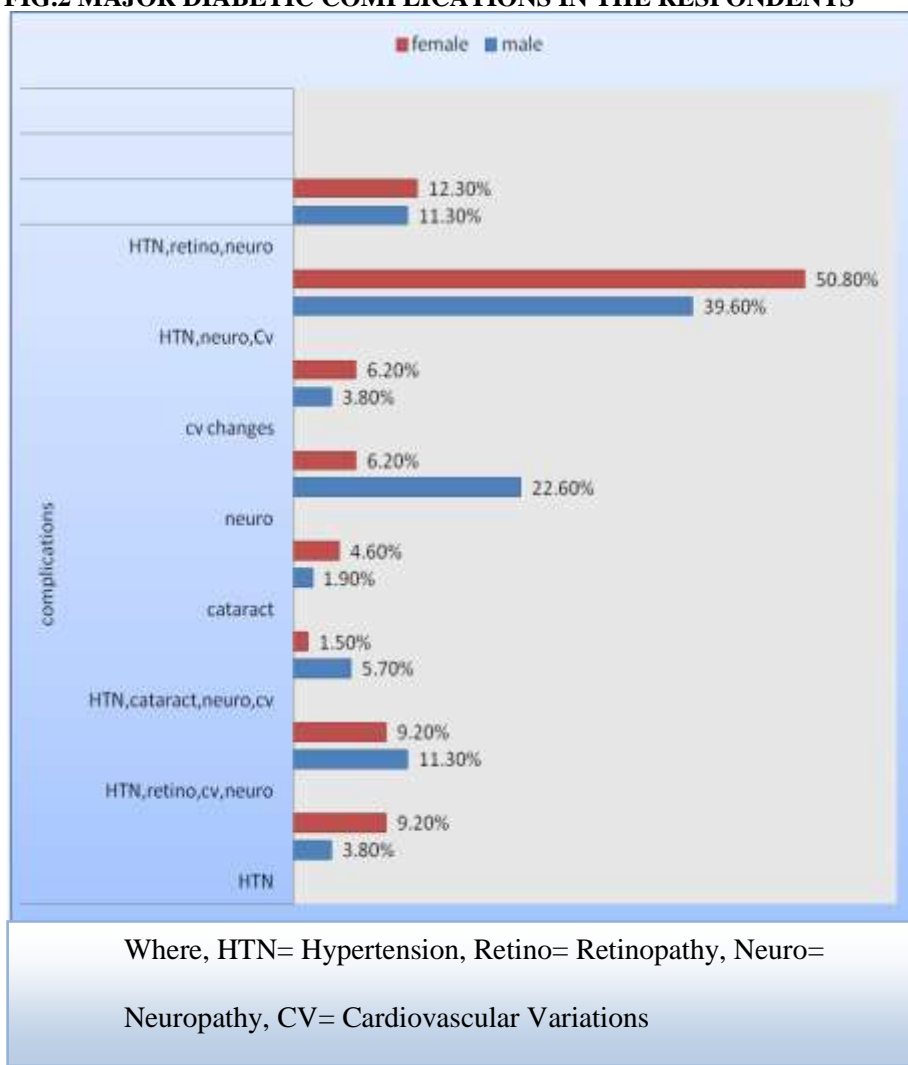
**TABLE: VARIOUS CHARACTERISTICS OF DIABETIC PATIENTS**

S.No.	Characteristics	Yes n (%)	No n (%)
1	Smoking	38 (32.2)	80 (67.8)
2	Family history of diabetes	58 (49.2)	60 (50.8)
		<b>Male</b>	<b>Female</b>
		<b>n (%)</b>	<b>n (%)</b>
3	Education for foot care	13 (24.5)	16 (24.6)
4	Practice for foot care	20 (37.7)	29 (44.6)
		<b>Oral only</b>	<b>Oral + diet</b>
5	Treatment for diabetes	76 (64.4)	42 (35.6)

**FIG.1 EDUCATION LEVEL OF DIABETIC PATIENTS**



**FIG.2 MAJOR DIABETIC COMPLICATIONS IN THE RESPONDENTS**



**REFERENCES**

1. Boulton AJ. The diabetic foot: grand overview, epidemiology and pathogenesis. *Diabetes Metab Res Rev* 2008; 24: S3–S6.
2. Papanas N, Maltezos E *et al.* Vincent declaration after 15 years or who cleft the devil’s foot? *Vasa* 2006; 35: 3–4
3. Edmonds M. The diabetic foot. *Diabetes Metab Res Rev* 2003; 20: S9–S12.
4. American Diabetes Association. Standards of medical care in diabetes—2014. *Diabetes Care* 2014; 37(1): S14–S80.
5. Wild S, Roglic G *et al.* Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004; 27(5): 1047–1053.
6. Grupo de Trabalho Internacional sobre Pé Diabético. Consenso internacional sobre pé diabético. Brasília: Secretaria de Estado de Saúde do Distrito Federal; 2001.
7. Trautner C, Haastert B *et al.* Incidence of lower limb amputations and diabetes. *Diabetes Care* 1996; 19(9): 1006-9.
8. Diabetes: International Diabetes Federation [On line] 2006. Available from: URL: [http://www.idf.org/webdata/docs/background\\_dis\\_final.pdf](http://www.idf.org/webdata/docs/background_dis_final.pdf).
9. Goodridge D, Trepman E *et al.* Health-related quality of life in diabetic patients with foot ulcers: Literature review. *J Wound Ostomy Continence Nurs* 2005; 32: 368–377.
10. Ragnarson-Tennvall G, Apelqvist J. Prevention of diabetes related foot ulcers and amputations: A cost-utility analysis based on Markov model simulations. *Diabetologia* 2001; 44: 2077–2087.
11. Harris MI, Couric CC *et al.* Diabetes in America, National Institutes of Health, Washington, DC, USA, 2nd edition, 1995.
12. Sowers JR, Epstein M *et al.* Diabetes, hypertension, and cardiovascular disease an update. *Hypertension* 2001; 37(4): 1053–1059.
13. Mullugeta Y, Chawla R *et al.* Dyslipidemia associated with poor glycemic control in type 2 diabetes mellitus and the protective effect of metformin supplementation. *Indian Journal of Clinical Biochemistry* 2012; 27(4): 363–369.
14. Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion (US), and Office on Smoking and Health (US), “How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the surgeon general,” in 6 Cardiovascular Diseases, Centers for Disease Control and Prevention (US), Atlanta, Ga, USA, 2010. <http://www.ncbi.nlm.nih.gov/books/NBK53012/>.

**Fakhsheena et al., World J Pharm Sci 2015; 3(7): 1319-1323**

15. De Pablos-Velasco P, Parhofer KG et al. Current level of glycaemic control and its associated factors in patients with type 2 diabetes across Europe: data from the PANORAMA study. *Clinical Endocrinology* 2014; 80(1): 47–56.
16. Kelsey WE, Thompson WD et al. *Methods in Observational Epidemiology*, Oxford University Press, New York, NY, USA, 2nd edition, 1996.
17. Al-Nozha MM, Al-Maatouq MA et al. Diabetes mellitus in Saudi Arabia. *Saudi Med J* 2004; 25: 1603–1610.
18. Adil M, Alam AY et al. Knowledge of type 2 Diabetic patients about their illness: pilot project. *J Pak Med Assoc* 2005; 55: 221-4.
19. Bader MS. Diabetic foot infection. *Am Fam Physician* 2008; 78(1): 71-79,81-82.
20. Teixeira CRS, Zanetti ML. Custos de consultas médicas em pessoas com diabetes mellitus durante um programa educativo. *Rev Baiana Saúde Pública* 2006; 30(2): 261-71.
21. Otero LM, Zanetti ML et al. Sociodemographic and clinical characteristics of a diabetic population at a primary level health care center. *Rev Latinoam Enferm* 2007; 15: 768-73.
22. Gamba MA, Gottlieb SLD et al. Amputações de extremidades inferiores por diabetes mellitus: estudo caso-controle. *J Public Health* 2004; 38(3): 399-404.
23. Khamesh ME, Vatankehah N et al. Knowledge and practice of foot care in Iranian people with type 2 Diabetes. *Int Wound Journal* 2007; 4: 298-302.
24. Bays HE, Chapman RH et al. The relationship of body mass index to diabetes mellitus, hypertension and dyslipidaemia: comparison of data from two national surveys. *International Journal of Clinical Practice* 2007; 61(5): 737–747, Erratum in *International Journal of Clinical Practice* 2007; 61(10): 1777-1778.
25. Bakhotmah BA. Prevalence of obesity among type 2 diabetic patients: non-smokers housewives are the most affected in Jeddah, Saudi Arabia. *Open Journal of Endocrine and Metabolic Diseases* 2013; 3: 25–30.
26. Abdella N, Al Arouj M et al. Non-insulin-dependent diabetes in Kuwait: prevalence rates and associated risk factors. *Diabetes Research and Clinical Practice* 1998; 42(3): 187–196.
27. Will JC, Williamson DF et al. Intentional weight loss and 13-year diabetes incidence in overweight adults. *The American Journal of Public Health* 2002; 92(8): 1245–1248.
28. King H, Aubert RE et al. Global burden of diabetes, 1995–2025: prevalence, numerical estimates, and projections. *Diabetes Care* 1998; 21(9): 1414–1431.
29. Qin X, Li J et al. Prevalence and associated factors of diabetes and impaired fasting glucose in Chinese hypertensive adults aged 45 to 75 years. *PLoS ONE* 2012; 7(8): Article ID e42538.
30. Azimi-Nezhad M, Ghayour-Mobarhan M et al. Prevalence of type 2 diabetes mellitus in Iran and its relationship with gender, urbanisation, education, marital status and occupation. *Singapore Medical Journal* 2008; 49(7): 571–576.
31. Gondal M, Bano U et al. Evaluation of knowledge and practices of foot care in patients with chronic type 2 diabetes mellitus. *J Post Grad Med Inst* 2007; 21: 104-8.
32. Neil JA. Assessing foot care knowledge in a rural population with diabetes. *Ostomy wound manage* 2002; 48: 50-6.
33. Péres DS, Santos MA et al. Difficulties of diabetic patients in the illness control: feelings and behaviors. *Rev Latinoam Enferm* 2007; 15(6): 1105-12.
34. Bernardes CHA, Penteadó JG et al. Pé diabético: análise de 105 casos. *Arq Bras Endocrinol Metab* 1993; 37(3): 139-42.
35. Young MJ, Breddy JL et al. The prediction of diabetic neuropathic foot ulceration using vibration perception thresholds. A prospective study. *Diabetes Care* 1994; 17(6): 557-60.
36. Gregg EW, Sorlie P et al. 1999-2000 national health and nutrition examination survey. Prevalence of lower-extremity disease in the US adult population 40 years of age with and without diabetes: 1999-2000 national health and nutrition examination survey. *Diabetes Care* 2004; 27(7):1591-7.
37. Gamba MA. A importância da assistência de enfermagem na prevenção, controle e avaliação à pacientes portadores de diabetes com neuropatia e vasculopatia. *Acta Paul Enferm* 1991; 4(2/4): 7-19.
38. James PA, Oparil S et al. Evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the eighth joint national committee (JNC 8). *The Journal of the American Medical Association* 2014; 311(5): 507–520.