Original Research Article

KNOWLEDGE, ATTITUDE AND PRACTICES (KAP) ON DIABETIC FOOT CARE AMONG PATIENTS WITH DIABETES IN DISTRICT BAHAWALPUR, PAKISTAN

Abstract

Diabetes mellitus is a chronic multifactorial metabolic illness that is characterized by numerous chronic complications. Diabetes affects almost every system of the body. Among these diabetic foot is one of the major complications of diabetes mellitus. Its main objective was to investigate the knowledge, attitude and foot care practices in diabetic patients suffering from diabetic foot lesions. An institutional-based cross-sectional study was designed to be conducted at Civil Hospital, Bahawalpur, Pakistan. Total 150 diabetic patients were selected by systematic random sampling method. Ratio of Type II diabetes was 91.3% whereas 23.3% patients were having family history of diabetes. 44.35% patients were having some knowledge about diabetes related complications whereas 45.44% patients were having a positive attitude towards control and prevention of diabetes related complications. Good foot care and footwear practices were being carried out by just 33.62% of the patients. Education regarding reducing increased body weight, knowledge about foot care practices, early detection and management of peripheral neuropathy and strict glycemic control could be very helpful in decreasing the diabetic foot complication.

Key words: Diabetes Mellitus, Knowledge, Attitude, Practice

1. Introduction

Diabetes mellitus is a chronic and complex metabolic disorder requiring continuous and proper medical care for maintenance of normal blood glucose level and reduction of complications (1). (2). Significant research evidences suggest that a wide range of interventions are required for the improvement of diabetic outcomes (3). Although a long list of complications affects a diabetic patient but one disastrous complication is diabetic foot or foot ulcer/lesion (4). Diabetic foot lesion has notable impact on socio-economic status and well being and of diabetic patient. It not

only hampers the quality of life but also has conspicuous result on the financial status of a diabetic patient (5).

Diabetic Foot lesion is a devastating condition because it also increases the rate disability and even death of diabetic patients (6). Foot ulcers can lead to recurrent hospital admission, superadded bacterial infections of lesions and even limb amputation in severe cases (7). Diabetic foot is very common and also one of most expensive complication of diabetes (8). In developing countries like Pakistan, diabetic foot lesions are very distressing for the diabetics (9). It is not only associated with significant risk of disability, morbidity and mortality but has a great psychological impact on diabetic patients (10). Study evidences suggest that 15% of diabetic patients can suffer from diabetic foot lesions at some stage of their disease (11). Severity of complication can vary from simple boil to life threatening secondary bacterial infection or even limb amputation (12).

Risk factors for diabetic foot lesions include peripheral neuropathy, peripheral vascular disease, shoes pressure, poor blood glucose control, cigarette smoking etc and these factors can also play an important role in patho-physiology of the disease (5). Although diabetic foot is a devastating and protracted condition associated with diabetes even then it can be prevented in high risk patients (6, 13). Prophylactic practices are very economical but not much prevalent that's one of the reason that incidence of diabetic foot lesion is very common and a challenge as well for health care professionals (14). Diabetic foot lesions need reliable, systematic and exclusive health care facilities for the prevention, early detection and management in diabetics (15). Study analysis recommend that age and weight along with educational status, self care practices, type of diabetes has remarkable effect on diabetic foot lesions (16). Yet, determining factors vary widely among diabetic patients with different socioeconomic status and has different influential factors for development of complications (17). Therefore, identification of such striking factors is very important for prevention of calamitous effect of diabetic foot lesions (18). Current study was designed to evaluate diabetic foot lesions and corresponding risk factors in adult diabetic patients visiting the diabetic clinic at the Civil Hospital, Bahawalpur, Pakistan. The findings of current study can be helpful in reducing the incidence of diabetic foot lesions and its associated complications in this region.

2. Methodology

An institutional-based cross-sectional study was conducted at Civil Hospital, Bahawalpur from the 1st of February to the 30th of March, 2019. Civil Hospital, Bahawalpur is a teaching and general hospital. It also serves as referral center for many patients from peripheral areas. Study population comprised of all diabetic patients who were attending the diabetic follow-up at the Civil Hospital, Bahawalpur during above mentioned time period. Diabetic patients having any lesion due to any trauma, accident and seriously ill patients or unable to communicate were excluded from the study. Diabetic foot lesion was dependent variable in this study. Whereas age, sex, religion, ethnicity, educational status, marital status, address, socioeconomic status, physical activity, cigarette smoking, type and duration of diabetic illness, body mass index, regular follow-up visit, history of ulceration, neuropathy and peripheral vascular disease were independent variables.

2.1: Sampling Procedure

Systematic random sampling method was adopted for selection of diabetic patients suffering from diabetic foot lesions. Patient was labeled as diabetic if his/her fasting blood glucose level was above 125 mg/dl. If patient's fasting blood glucose level was in the range of 100 and 125 mg/dl, he/she was labeled as controlled. Diabetic foot lesion is a non traumatic laceration of skin on the foot of a person suffering from diabetes. Patients scoring mean (6) and above from knowledge assessment questionnaire were considered knowledgeable. Patients scoring mean (7) and above from foot care practice assessment questionnaire were considered as good in foot care practices. Patient was suffering from neuropathy if he/she had at least one of the following symptoms: gradual numbness, burning pain, freezing, vibration from the skin, muscle weakness, extreme sensitive to touch and lack of coordination. Diabetic patient having one of the following symptoms was suffering from peripheral vascular disease: muscle cramps after movement, painful cramping in their hip, erectile dysfunction, sores on the toes, numbness of legs, change in the color of legs, shiny skin of leg and lesion on legs or feet that is not healing.

2.2: Data Collection and Analysis

Data was collected by a structured and pretested questionnaire via face-to-face interview and by direct observation of the patient. The questionnaire was prepared in English, translated to local

language (Urdu) then back to English to keep its consistency. Data collectors were also given one day training. All adult diabetic patients attending the diabetic follow-up at the Civil Hospital, Bahawalpur, were included in this study. Diabetic foot lesions were measured in non traumatic diabetic patients.

2.3: Ethical Considerations

Ethical clearance was obtained from the Institutional Ethical Committee of the University College of Conventional Medicine, The Islamia university of Bahawalpur. An official letter of cooperation was written to the Civil Hospital Bahawalpur administration. After explaining the purpose of the study, an informed written consent was obtained from each of the study participant according to the declaration of Helsinki. Participants were also informed that participation was on a voluntary basis and that they could withdraw at any time, for any reason. Personal identifiers were not included in the written questionnaires to ensure participants' confidentiality.

3. Results

3.1: Socio-demographic Characteristics

Total 150 diabetic patients were included in the study. Sex distribution was 56% (84 male patients) and 44% (66 female patients). Age of the patients was from 21-50 years. 13 (8.66%) patients were suffering from Type I diabetes whereas 137(91.3%) patients were suffering from type II diabetes. No case of gestational diabetes was reported. 35 (523.3%) patients had a family history of diabetes (Table 1).

Table 1: Socio-demographic Characteristics

	Frequency	**Percentage**
Age distribution		
21-30	27	18%
31-40	52	34%
41-50	71	47.3%

Sex distribution		
Male	84	56%
Female	66	44%
Diabetes mellitus type		
Type I	13	8.66%
Type II	137	91.3%
GDM	-	-
Family history of diabetes	35	23.3%
Diabetes education	69	46%

3.2: Knowledge about Diabetic Foot

Total 150 patients participated in this study from which 45.37% people were aware and 42.75% were unaware of foot care practices. 24.7% patients were not having any knowledge about it. Feet were examined by 86(57.3%) patients on regular basis whereas 21(14%) patients didn't examine their feet. n=43(28%) participants were not aware of this point. 94(62%) patients were having some knowledge regarding foot complications, 35(23%) participants were not aware and 21(14%) participants answered that they DON'T KNOW. 69(46%) patients were having knowledge about reduced blood flow in their feet while 32(21.3%) patients didn't know it. 43(28.6%) patients were aware that reduced blood flow to feet could develop foot ulcers while 54(36%) patients had no knowledge of it. 66(44%) patients observed loss of sensation in their feet whereas 21(14%) didn't. 89(59.3%) patients were aware of developing foot gangrene while 43(29.6%) were not.98(65.3%) patients were getting proper information regarding foot care whereas 33(22%) patients were not getting any such awareness. 35(23.3%) patients were having knowledge that smoking can reduce blood flow towards feet whereas 78(52%) patients were not aware of I (Table 2).

Table 2: Knowledge about Diabetic Foot

	Yes		**NO**		**Don't know**	
	Number	%	**Number**	%	**Number**	%
Examination of	86	57.3	21	14	43	28

feet						
Knowledge of foot wound/infection	94	62	35	23	21	14
Reduced blood flow to feet	69	46	32	21.3	49	32.6
Foot ulcers due to reduced blood flow	43	28.6	54	36	53	35.3
Loss of sensation in feet	66	44	21	14	63	42
Foot gangrene	89	59.3	43	28.6	18	12
Foot ulcers	56	37.3	71	47.3	23	15.3
Information regarding foot care	98	65.3	33	22	19	12.6
Effect of smoking	35	23.3	78	52	37	24.6

3.3: Patient's Attitude towards control & prevention of Diabetic Foot

Next questionnaire was to assess the attitude of participants towards control and prevention of diabetic complications. 45.44% participants attitude was good towards foot care and 24.24% participants was not satisfied and the attitude of 30.24% was with a label of don't know as they were totally unaware of diabetic foot care. Questions regarding life style changes, any effect of routine changes on the control of diabetes and its complications was asked. Neither the patients were willing to wear any special foot ware to reduce the foot ulcers nor were they doing any self examination of the feet (Table 3).

Table 3: Patient's Attitude towards control & prevention of Diabetic Foot

	Yes		**NO**		**Don't know**	
	Number	%	**Number**	%	**Number**	%
Life style changes	108	72	26	17.3	16	10.6
Effect of routine	81	54	47	31.3	22	14.6

changes						
Willing to use special footwear	55	36.6	41	27.3	54	36
Use of indoors footwear	24	16	39	26	87	58
Self examination of feet	73	48.6	29	19.3	48	32

3.4: Foot care and footwear Practices by diabetic Patient

The net result of participants that were carrying good foot care practices was about 33.62%, about 46.44 participants were not practicing any technique and almost 19.5% participants were not having any knowledge about it. Daily foot washing was done by 108 (72%) patients and 26(17.3%) were not washing their feet daily. Foot temperature was checked by 86 (57.3%) patients and 59(39.3%) patients were not doing so. Nail care was done by 46 (30.6%) patients whereas 89(59.3%) were not paying attention to it. Toes care was done by 68(45.3%) patients whereas it was neglected by 44(29.3%) patients. 69 (46%) patients were keen to observe their feet after removal of socks and shoes whereas 48 (32%) were not doing any such practice (Table 4).

Table 4: Foot care and footwear Practices by diabetic Patient

	Yes		**NO**		**Don't know**	
	Number	%	**Number**	%	**Number**	%
Daily foot wash	108	72	26	17.3	16	10.6
Feet temperature	86	57.3	59	39.3	48	32
Follow up visit	23	15.3	108	72	19	12.6
Shoe examination	22	14.6	79	52.6	49	32.6
Feet comfort in shoes	28	18.6	64	42.6	58	38.6
Nail care of feet	46	30.6	89	59.3	15	10
Toes care	68	45.3	44	29.3	38	25.3
Moisturization of	31	20.6	78	52	41	27.3

feet						
Feet examination after socks/shoes removal	69	46	48	32	33	22
Notice of injury	20	13.3	96	64	34	22.6

4. Discussion

Current study indicates that poor educational status, low socioeconomic conditions and negligence about foot care were the contributory factors for increasing incidence of diabetic foot lesions. Uncontrolled diabetes mellitus also increases the severity of disease and makes patients more prone towards complications including diabetic foot (19). Data shows that bad selection of shoes like chappals by diabetics having no support for heel and divider that is splitting the toes is one of major risk factor (20). Detailed feet examination should be carried out at each follow up visit by the physician to prevent neuropathy at its initial stage (20-22). Neuropathy leads to loss of sensation in feet (23). This is why abnormal and persistent increased pressure on feet remains undiagnosed. Skin cell react to this increased pressure by increasing keratinization that facilitates callus formation (24). Callus itself predisposes diabetic patient to foot lesions (25). Decreased blood supply to feet also slows down the healing process in case of any lesion or injury in this area (26). That's the reason foot callus develop very quickly in patients suffering from peripheral neuropathy (27). Increased body weight of diabetic patients is also another risk factor (28). Obesity increases the risk of atherosclerosis in diabetic patients that cause decrease blood supply to lower extremities particularly feet. In case of any wound the conditions are also favorable for the growth of bacteria as well that lead to secondary bacterial infection of the diabetic feet (29).

Foot care practices vary from person to person among diabetics (30). The results showed that a good foot care practice is very protective in reducing the likelihood of diabetic foot lesions. This finding is also comparable with the previous studies conducted in different settings (31). Poor foot care practices like lack of daily feet washing, proper drying of feet after washing or after removal of shoes and socks and lack of early detection and management of any abnormality contribute to the increased incidence of diabetic foot lesions (31). Prolonged diabetic illness and poverty were two major risk factors for the development of foot lesions (32).

In order to decrease the risk of foot lesions it is recommended that patient should inspect his/her feet on daily basis for any cut, blister, redness, swelling or any nail problem (33). Daily feet washing with luke warm water and drying properly especially between toes should be advised. A good moisturizer should be used to avoid cracking and itching (34). Nails should not be cut too short in order to avoid ingrowing (35). Patient should not treat any corn or callus by him/herself (36). Proper medical advice is needed in such cases. Blood glucose level should be controlled in normal range (37). Patient should not walk bare footed in order to avoid any cut or scratch (38). Smoking should be avoided as it restricts blood flow towards feet (39). Feet should be kept dry and warm (40). Regular examination of the feet is very much important (31).

5. Conclusion

Ratio of Diabetic foot lesion was very alarming in patients suffering from diabetes mellitus. It is important to develop awareness of diabetes and its complications in the general population. Health care professionals can play their role in tackling diabetic foot lesions by educating patients about foot care practice, life style changes and proper follow-up especially of the patients who are from rural areas. By educating diabetic patient about control of diabetes and body weight, early detection and management of any foot lesion, infection or neuropathy can be helpful in reducing the incidence of diabetic foot lesions.

Study limitations

The small sample size was the limitation of this study. It was a cross-sectional study design that decreased the power of the study. It also decreased causal conclusion between diabetic foot lesions and its associated risk factors.

References

1. Cefalu WT, Berg EG, Petersen MP, Darsow T. American Diabetes Association's Standards of Care: A paradigm shift in the dissemination of information. Am Diabetes Assoc; 2018.

2. Association AD. 13. Children and adolescents: standards of medical care in diabetes—2021. Diabetes care. 2021;44(Supplement_1):S180-S99.

3. Davies MJ, D'Alessio DA, Fradkin J, Kernan WN, Mathieu C, Mingrone G, et al. Management of hyperglycaemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetologia. 2018;61(12):2461-98.

4. Mariam TG, Alemayehu A, Tesfaye E, Mequannt W, Temesgen K, Yetwale F, et al. Prevalence of diabetic foot ulcer and associated factors among adult diabetic patients who attend the diabetic follow-up clinic at the University of Gondar Referral Hospital, North West Ethiopia, 2016: Institutional-Based Cross-Sectional Study. Journal of diabetes research. 2017;2017.

5. Gowri M, Harikrishnan V. Clinical study on the efficacy of nanocrystalline-silver in diabetic foot. International Journal of Health and Clinical Research. 2021;4(6):73-7.

6. Najafi B, Reeves ND, Armstrong DG. Leveraging smart technologies to improve the management of diabetic foot ulcers and extend ulcer-free days in remission. Diabetes/metabolism research and reviews. 2020;36:e3239.

7. Shatnawi NJ, Al-Zoubi NA, Hawamdeh HM, Khader YS, Garaibeh K, Heis HA. Predictors of major lower limb amputation in type 2 diabetic patients referred for hospital care with diabetic foot syndrome. Diabetes, metabolic syndrome and obesity: targets and therapy. 2018;11:313.

8. Jalilian M, Sarbarzeh PA, Oubari S. Factors related to severity of diabetic foot ulcer: a systematic review. Diabetes, metabolic syndrome and obesity: targets and therapy. 2020;13:1835.

9. Riaz M, Miyan Z, Waris N, Zaidi SI, Tahir B, Fawwad A, et al. Impact of multidisciplinary foot care team on outcome of diabetic foot ulcer in term of lower extremity amputation at a tertiary care unit in Karachi, Pakistan. International wound journal. 2019;16(3):768-72.

10. Zhang Y, Chen Y, Ma L. Depression and cardiovascular disease in elderly: Current understanding. Journal of Clinical Neuroscience. 2018;47:1-5.

11. Jeffcoate WJ, Vileikyte L, Boyko EJ, Armstrong DG, Boulton AJ. Current challenges and opportunities in the prevention and management of diabetic foot ulcers. Diabetes care. 2018;41(4):645-52.

12. Sartelli M, Guirao X, Hardcastle TC, Kluger Y, Boermeester M, Raşa K, et al. 2018 WSES/SIS-E consensus conference: recommendations for the management of skin and soft-tissue infections. World Journal of Emergency Surgery. 2018;13(1):1-24.

13. Fawzy MS, Alshammari MA, Alruwaili AA, Alanazi RT, Alharbi JA, Almasoud AMR, et al. Factors associated with diabetic foot among type 2 diabetes in Northern area of Saudi Arabia: a descriptive study. BMC Research Notes. 2019;12(1):1-7.

14. Armstrong DG, Boulton AJ, Bus SA. Diabetic foot ulcers and their recurrence. New England Journal of Medicine. 2017;376(24):2367-75.

15. Bekele H, Asefa A, Getachew B, Belete AM. Barriers and Strategies to Lifestyle and Dietary Pattern Interventions for Prevention and Management of TYPE-2 Diabetes in Africa, Systematic Review. Journal of Diabetes Research. 2020;2020.

16. AJ SJ, Gomes L. Effects of an educational program focused on self-care and concurrent physical training on glycemia and drug treatment of patients with diabetes mellitus. Diabetes. 2019;5:1-7.

17. Hicks CW, Canner JK, Mathioudakis N, Sherman RL, Hines K, Lippincott C, et al. Neighborhood socioeconomic disadvantage is not associated with wound healing in diabetic foot ulcer patients treated in a multidisciplinary setting. Journal of Surgical Research. 2018;224:102-11.

18. Amin N, Doupis J. Diabetic foot disease: from the evaluation of the "foot at risk" to the novel diabetic ulcer treatment modalities. World journal of diabetes. 2016;7(7):153.

19. Kateel R, Augustine AJ, Prabhu S, Ullal S, Pai M, Adhikari P. Clinical and microbiological profile of diabetic foot ulcer patients in a tertiary care hospital. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2018;12(1):27-30.

20. Wang D, Ouyang J, Zhou P, Yan J, Shu L, Xu X. A novel low-cost wireless footwear system for monitoring diabetic foot patients. IEEE Transactions on Biomedical Circuits and Systems. 2020;15(1):43-54.

21. Vinik AI, Nevoret M-L, Casellini C, Parson H. Diabetic neuropathy. Endocrinology and Metabolism Clinics. 2013;42(4):747-87.

22. Alavi A, Sibbald RG, Mayer D, Goodman L, Botros M, Armstrong DG, et al. Diabetic foot ulcers: Part I. Pathophysiology and prevention. Journal of the American Academy of Dermatology. 2014;70(1):1. e-. e18.

23. Pokhriyal V, Kothiyal P, Kumar N, Kaushik S. A review on diabetic neuropathy: Complications and treatment. Asian J Pharm Pharmacol. 2018;4(4):413-20.

24. Ishitsuka Y, Ogawa T, Roop D. The KEAP1/NRF2 signaling pathway in keratinization. Antioxidants. 2020;9(8):751.

25. Kasiya MM, Mang'anda GD, Heyes S, Kachapila R, Kaduya L, Chilamba J, et al. The challenge of diabetic foot care: Review of the literature and experience at Queen Elizabeth Central Hospital in Blantyre, Malawi. Malawi Medical Journal. 2017;29(2):218-23.

26. Zubair M, Ahmad J. Role of growth factors and cytokines in diabetic foot ulcer healing: a detailed review. Reviews in Endocrine and Metabolic Disorders. 2019;20(2):207-17.

27. Binns-Hall O, Selvarajah D, Sanger D, Walker J, Scott A, Tesfaye S. One-stop microvascular screening service: an effective model for the early detection of diabetic peripheral neuropathy and the high-risk foot. Diabetic Medicine. 2018;35(7):887-94.

28. Park K-Y, Hwang H-S, Cho K-H, Han K, Nam GE, Kim YH, et al. Body weight fluctuation as a risk factor for type 2 diabetes: results from a nationwide cohort study. Journal of clinical medicine. 2019;8(7):950.

29. Ramirez-Acuña JM, Cardenas-Cadena SA, Marquez-Salas PA, Garza-Veloz I, Perez-Favila A, Cid-Baez MA, et al. Diabetic foot ulcers: current advances in antimicrobial therapies and emerging treatments. Antibiotics. 2019;8(4):193.

30. Association AD. 10. Microvascular complications and foot care. Diabetes care. 2017;40(Supplement_1):S88-S98.

31. Bus SA, Lavery LA, Monteiro-Soares M, Rasmussen A, Raspovic A, Sacco IC, et al. Guidelines on the prevention of foot ulcers in persons with diabetes (IWGDF 2019 update). Diabetes/metabolism research and reviews. 2020;36:e3269.

32. Aleidan FA, Ahmad BA, Alotaibi FA, Aleesa DH, Alhefdhi NA, Badri M, et al. Prevalence and risk factors for diabetic peripheral neuropathy among saudi hospitalized diabetic patients: a nested case-control study. International Journal of General Medicine. 2020;13:881.

33. Zhu X, Lee M, Chew EA, Goh LJ, Dong L, Bartlam B. "When nothing happens, nobody is afraid!" beliefs and perceptions around self-care and health-seeking behaviours: Voices of patients living with diabetic lower extremity amputation in primary care. International Wound Journal. 2021;18(6):850-61.

34. Organization WH. HEARTS D: diagnosis and management of type 2 diabetes. World Health Organization, 2020.

35. Haneke E. Nail surgery. Cosmetic medicine and surgery. 2017:301-16.

36. Lecker LAM. Translation, cross-cultural adaptation, validity and reliability of the German Diabetes Foot Self-Care Behavior Scale (DFSBS-D): Universität Oldenburg; 2020.

37. Rahmanian F, Asemani MH, Dehghani M, Mobayen S. Robust dynamic output feedback control of blood glucose level in diabetic rat with robust descriptor Kalman filter. Biomedical Signal Processing and Control. 2022;71:103088.

38. Coffey L, Mahon C, Gallagher P. Perceptions and experiences of diabetic foot ulceration and foot care in people with diabetes: a qualitative meta-synthesis. International wound journal. 2019;16(1):183-210.

39. Robinson S. Cardiovascular disease. Priorities for Health Promotion and Public Health: Routledge; 2021. p. 355-93.

40. Bowering CK. Diabetic foot ulcers. Pathophysiology, assessment, and therapy. Canadian Family Physician. 2001;47(5):1007-16.