

Practices followed by type-II diabetes mellitus patients for prevention of foot ulcers

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ABSTRACT

Background: Type-II diabetes mellitus is a serious lifestyle-related health problem globally and its prevalence is rapidly increasing day by day. The main purpose of this study was to assess practices followed by Type-II diabetes mellitus patients regarding the prevention of foot ulcers. **Method:** This study was a cross-sectional study using a case series type of research design. Purposively, a total of 100 type-II diabetes mellitus patients were registered with AIIMS Rishikesh for their treatment. Data collection tools were a semi-structured questionnaire that included 20 items. By conducting an interview schedule, data was collected from each participant. **Results:** Majority of participants belong to age group of 51–60 years and were males. Practice score showed majority of Type-II DM patients were following moderate-level practices, followed by only few (15%) were following good practice for preventing foot ulcers. **Conclusion:** Health care professionals must empathize on educating type-II diabetes patients regarding preventive measures for foot ulcers. Educate patients regarding the importance of self-foot care practice and promoting them for proper follow-up as well to decrease incidence of diabetic foot ulcers.

Keywords: Practices, prevention of foot ulcers, type-II diabetes mellitus

Introduction

Diabetes mellitus (DM) is a chronic multisystem disease that occurs either due to abnormal insulin production, impaired insulin utilization or both.^[1] DM is a serious health condition whose prevalence is rapidly increasing day by day globally including India.^[2] India is gaining the title of diabetic capital of the world i.e. around 63 million people are suffering from DM.^[3] Approximately 5% of DM patients are living in India.^[4] DM mainly affects people under the age of 40 years,^[5] and about 40% among it develop DM before the age of 20 years,^[6] which is a serious matter. Risk factors for developing DM mainly include either obesity^[7] or being older^[8] or having a family history of

DM.^[9] DM is seen less frequently in children, but due to the increasing prevalence of childhood obesity, its incidence is increasing.^[10]

DM has long-term complications, which makes it a devastating disease.^[11] DM is a leading cause for adult blindness,^[12] end-stage kidney disease^[13] and nontraumatic lower-limb amputations.^[14] Approximately 35%–40% of DM patients had complications related to DM at the time of diagnoses.^[15] Foot ulcer is one of the major health complication among DM patients.^[16] Approximately 15%–25% of DM patients may develop foot ulcers at some point in their life, which may result in physical disability and reduction of quality of life and even death.^[17] In advanced stages, foot ulcers further proceed into amputations.^[18]

Research evidence showed that several factors involved in the process of development of foot ulcers i.e. peripheral neuropathy, peripheral vascular disease, limited joint mobility and repeated trauma from abnormal weight distribution in the

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foot.^[19] The typical sequence of development of diabetic foot ulcer begins with a soft tissue injury in the foot, followed by the formation of fissures which further leads to the formation of a callus.^[20] Due to peripheral neuropathy, DM patients had insensitive foot which does not feel any external injuries from thermal, chemical, or traumatic.^[21] All these causes are irreversible and chronically progressive into foot ulcers. The foot ulcer treatment itself is very challenging and often long lasting. It may require expert care, orthopedic appliances, and antimicrobial drugs along with topical dressing and inpatient care.^[22]

More than 50% of DM-related amputations are preventable, if we provide proper education to DM patients related to foot care measures on a daily basis.^[23] Burden of diabetic foot disease is again expected to increase worldwide due to the increasing global prevalence of DM. So, proper practices of foot care must be followed by DM patients to avoid this physical, social and financial burden.^[24] Urgent need for reduction of prevalence of foot ulcers among DM patients to reduce the enormous burden on patients as well as health care resources. So the aim of this study was to assess practices followed by type-II DM patients regarding the prevention of foot ulcers.

Material and Method

Research type and design

This study was a cross-sectional research study using a case series type of research design. Purposively, a total of 100 type-II DM patients who were either registered in OPD (outpatient department) or IPD (inpatient department) of AIIMS Rishikesh were interviewed for this study.

Inclusion and exclusion criteria

The inclusion criteria for DM patients were the age of patients between 40 and 70 years, who are willing to participate, medical diagnosis of type II DM, who can read and write Hindi/English. The exclusion criteria of the study included who were diagnosed with type-I DM.

Data collection tools and procedure

Data collection tools mainly include three sections. Section I includes eight demographic variables questions. Section II includes eight clinical variables questions. Section III consists of checklist for assessing practices regarding prevention of foot ulcers among DM patients, which consist of 20 items. Scores from 0 to 7 means poor practice, scores from 8 to 13 means moderate practice and scores from 14 to 20 means good practice for prevention of foot ulcers.

Ethical considerations

The study received ethical approval from the Institutional Ethics Committee (SRS/IEC/2017/111) on dated 12/08/2017 of the All India Institute of Medical Sciences Rishikesh. Informed consent was obtained from each participant. Anonymity and

confidentiality were maintained during the study. Data analysis was done by using SPSS version 23.0.

Results

Of 100 DM patients, predominant age of the study participants were 51–60 years old, male and belong to a rural habitat. Most of them were having high school education and doing household activities. Majority had family as previous sources of information for diabetes, non-smokers, and nonalcoholics. [Table 1]

Majority of DM patient's heights were 5 to 5.5 feet and weights were 51–60 kg. Predominant DM patient's HbA1c was more than 6.5% and had a diagnosis of DM more than 1–5 years. Majority of them do not have a family history of DM. Most of them were on using vegetarian diet. Regarding diabetic medication, most of them were taking daily diabetic medications, whereas most of them were on oral diabetic pills (72%) and only a few were taking insulin injections (9%). Around 19% were consuming both oral diabetic pills and insulin injections. Majority of them did not get any (65%) knowledge regarding specific foot care done amongst DM patients. Only few (35%) were having knowledge regarding specific foot care, that information they got from their treating doctors (63%). [Table 2]

Majority of DM patients were aware of foot care (60), but did not have any discussion on how to do foot care (52). The majority do not have any pain, tingling sensation, numbness or needle like itching in their feet (59). The majority did not examine in their feet (78) and soak their feet (61) regularly. But most of them wash

Table 1: Demographic variables of DM patients (n=100)

Variables	Options	Frequency	Percentage
Age (Years)	40-50	32	32%
	51-60	35	35%
	61-70	33	33%
Gender	Male	52	52%
	Female	48	48%
Habitant	Rural	52	52%
	Urban	48	48%
Education	Illiterate	22	22%
	High school	44	44%
	Higher secondary	18	18%
Occupation	Graduate or above	16	16%
	Household activities	55	55%
	Highly active worker	15	15%
	Moderately active worker	05	05%
Previous source of information	Sedentary worker	25	25%
	Family	63	63%
	Friends	03	03%
Smoker	Social media	26	26%
	Health care person	08	08%
	Yes	13	13%
Alcohol consumption	No	87	87%
	Yes	09	09%
	No	91	91%

Table 2: Clinical variables of DM patients (n=100)

Variables	Options	Frequency	Percentage
Height (Feet)	5-5.5	68	68%
	5.6-6	32	32%
Weight (Kg)	40-50	26	26%
	51-60	36	36%
	61-70	29	29%
	71-80	05	05%
	81-90	04	04%
HbA1c (%)	4-5.6	00	0%
	5.7-6.4	08	8%
Duration from which DM is diagnosed	More than 6.5	92	92%
	1-6 months	08	08%
	7-12 months	06	06%
	1-5 years	40	40%
	6-10 years	17	17%
	More than 10 years	29	29%
Family history of DM	Yes	31	31%
	No	69	69%
Consumption of diabetic medications	Yes	94	94%
	No	06	06%
If Yes, then specific	Oral diabetic pills	71	72%
	Insulin injection	08	09%
	Both	15	19%
Diet	Vegetarian	34	34%
	Non-vegetarian	18	18%
	Vegetarian diabetic diet	31	31%
	Non-vegetarian diabetic diet	17	17%
Previous information about specific foot care to be done amongst DM patients	Yes	35	35%
	No	65	65%
If Yes, then information provided by whom	Doctor	22	63%
	Nurse	05	15%
	Relatives	02	05%
	Friends	06	17%
	Others	00	00%

their feet with warm water daily (55), test the water temperature before putting their feet in it (86) and moisturize their feet with applying cream (78).

Most of them did not dry well in-between toes (78), did not extra care while cutting toe nails (75), did not apply hot water bottle on their feet (68).

Most of them walk around with bare feet (84) and check their shoes before wearing for any foreign object (72).

They do not wear socks while wearing shoes (78), do not wear tight elastic socks (67) and do not sit by keeping legs in crossed for long duration (66).

Most of them use medication for their warts, corns or calluses on feet (63) and patients accepted that their cut heal slowly (75). Most of them use home remedies or over-the-counter agents to treat foot problems (92) and patients are taking their diabetic medications regularly and come to follow-up to the hospital (89) regularly. [Table 3]

So the overall majority of type-II DM patients were following moderate level practices (67%) for prevention of foot ulcers. Only few (15%) patients were following good practice for prevention of foot ulcers. [Table 4]

Chi-square test showed a significant association of practice level with gender (0.00*), previous source of information (0.00*) and alcohol consumption (0.02*) done by DM patients. Odds ratio also showed that age groups of 61 to 70 years have 0.63 times poor practice as compared to 51 to 60 years age group DM patient. Female gender has 1.01 times more chances for poor practice than males. Urban area patients have 1.19 times poorer practice for foot ulcer prevention than rural area patients. High -school educated patients have 1.93 times poorer practice for foot ulcer prevention than graduate patients. Patients who receive information about DMs from social media are following 0.57 times poorer practices than family information patients. DM patients who are non-smoker have 0.48 times poorer practices for foot ulcer prevention than smokers. DM patients who are non-alcoholic have 0.13 times poorer practices than alcoholics for foot ulcer prevention. [Table 5]

Table 3: Practices followed for prevention of foot ulcers (n=100)

Item	Yes	No
Do you know what foot-care is?	60	40
Have you ever been a part of discussion on how to take care of your feet?	48	52
Feel pain, tingling sensation, numbness or needle like itching in your feet?	41	59
Examine your foot daily?	22	78
Ever soak your feet?	39	61
Wash your feet with warm water every day?	55	45
Always test water temperature before putting your foot in?	86	14
Dry well in-between the toes?	40	60
Use a moisturizing cream on your feet?	78	22
Take extra care while cutting toe nails?	25	75
Use a hot water bottle or heating devices on your feet?	32	68
Ever walk around in your bare feet?	84	16
Always check your shoes for any foreign object or torn linings before wearing them?	72	28
Always wear socks while wearing shoes?	22	78
Use tight elastic socks?	33	67
Sit with your legs crossed for long duration?	34	66
Use medicated products for warts, corns or calluses?	63	37
Does your cut or abrasions heal slowly as compared to others?	25	75
Use Self-medicate or home remedies or over the counter agents to treat foot problems?	92	08
Do you take your diabetic medications regularly and go for follow-up to the hospital?	89	11

Table 4: Level of practice for prevention of foot ulcers (n=100)

Scores	Level of Practice	Frequency	Percentage
0-7	Poor Practice	18	18%
8-13	Moderate Practice	67	67%
14-20	Good Practice	15	15%

Discussion

This study showed that the majority of patients were of age groups of 51-60 years, male, belonging to rural areas. Most of them got information related to diabetes from their family (63%), were nonsmokers and non-alcoholics. Another study showed that incidence of type-II DM is higher in less than 60 years age groups and in females.^[25]

The study also showed that majority of DM patients did not get any information regarding specific foot care that is required. A study showed that good knowledge of foot care among DM patients will reduce the risk of foot complications in the future.^[26] This study also revealed that DM patients were following moderate level practices (67%) for prevention of foot ulcers. Only a few patients followed good practice for prevention of foot ulcers. Another study findings also suggested that if we want to reduce incidence of foot ulcers among DM patients, we must teach patients as well as caregivers appropriate techniques for foot care.^[27]

Diabetic patients whose age is more than 60 years were 0.63 times more chances for poor practices for foot care than diabetic patients for age 41 to 50 [AOR = 0.63; 95 percent CI: [0.23-1.71]]. Diabetic patients of female gender have 1.01 times more chances for poor practices for foot care than male [AOR = 1.01; 95

percent CI: [0.46-2.23]]. Diabetic patients in urban areas were 1.19 times more likely than diabetic patients in rural areas to have diabetic foot ulcers [AOR = 1.19; 95 percent CI: [0.54-2.62]]. Diabetic patients who were high-school educated were 1.93 times more likely for poor practices than diabetic patients who had graduate-level education [AOR = 1.93; 95 percent CI: [0.61-6.18]].

Thus this study concluded that rural residence, overweight, poor foot self-care practices and diabetic neuropathy are factors that are mainly associated with diabetic foot ulcer formation.^[28] A systemic review results showed that type-II DM-related foot care knowledge and practices reduce lower extremity complications significantly, so foot care knowledge and foot care practices are effective methods to overcome further complication related to DM.^[29] It is recommended that health care physicians must improve preventive measures in the reduction of diabetic foot ulcers by promoting foot self-care, paying special attention during follow-up of patients who came from rural areas, educating patients to reduce overweight gain, and effectively managing neuropathy to reduce the occurrence of diabetic foot ulcers.

Limitations of the study

This study could be reporting bias regarding alcohol use, smoking, and follow-up.

Conclusion

Recently, India became the diabetes capital of the world, in which approximately 50 million of people are suffering from type-II DM. This study will make a great implication not only in India, but globally also because of the increase in the number

Table 5: Association among practice's level with different demographic variables (n=100)

Variables	Options	Practice		Chi square value	Odd's ratio
		Poor Practice	Good Practice		
Age (Years)	40-50	11	21	0.17	1
	51-60	20	15		0.39 [0.15-1.06]
	61-70	15	18		0.63 [0.23-1.71]
Gender	Male	24	28	0.001*	1
	Female	22	26		1.01 [0.46-2.23]
Habitant	Rural	25	27	0.664	1
	Urban	21	27		1.19 [0.54-2.62]
Education	Illiterate	14	08	0.139	0.57 [0.15-2.12]
	High school	15	29		1.93 [0.61-6.18]
	Higher secondary	09	09		1 [0.26-3.85]
	Graduate or above	08	08		1
Occupation	Household activities	25	30	0.91	0.8 [0.31-2.09]
	Highly active worker	06	09		1 [0.27-3.69]
	Moderately active worker	05	00		NA
	Sedentary worker	10	15		1
Previous source of information	Family	23	40	0.006*	1
	Friends	02	01		0.29 [0.02-3.35]
	Social media	13	13		0.57 [0.23-1.45]
	Health care person	08	00		NA
Smoker	Yes	04	09	0.237	1
	No	42	45		0.48 [0.14-1.66]
Alcohol consumption	Yes	01	08	0.02*	1
	No	45	46		0.13 [0.02-1.06]

of amputations among diabetic people due to diabetic foot complications. The study was aimed to assess the level of practice of type-II DM patients for prevention of foot ulcers, which will help health professionals and policy makers to rethink about new measure. In future, health care team should emphasize on initiate of health education program to improve the quality of self-care regarding foot care among diabetic patients. This study will play a pivot role in reducing diabetic foot complications in the future. Therefore, it can be concluded that all health care providers are recommended to keep emphasize on preventive measures to reduce prevalence of foot ulcer either by promoting self-foot care practice, regular follow-up and educating patients and their family members as well.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patients has given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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