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KNOWLEDGE OF DIABETIC FOOT ULCER CARE AND ITS CORRELATES AMONG PATIENTS VISITING A TERTIARY CARE HOSPITAL IN MORADABAD, INDIA

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ABSTRACT

Introduction: Diabetes dramatically increases the risk of lower extremity amputation because of infected, non-healing foot ulcers. The objective was to assess the knowledge of diabetic foot practices and find association with socio-demographic variables in patients visiting a tertiary care hospital in Uttar Pradesh.

Methods: Hospital based cross-sectional study involving clinically diagnosed adult (>18 years) patients of Diabetic Foot.

Results: Maximum knowledge score was found in the age group 40-50 years, females, rural residence, semi-skilled/ skilled occupation, higher education, religion other than Hindu or Muslim, living alone and belonging to socio-economic class IV. The maximum attitude score in age>60 years, females, urban area, semi-skilled/ skilled workers, higher education, Hindu religion and living in a joint family. Among the practices, maximum score was seen in age>60 years, females, urban areas, semi-professional/ professional occupation and higher education. Significant association was seen with duration of Diabetes, prior receipt of information, treatment compliance and type of foot wear used.

Conclusion: This study highlights the importance of variables like compliance to treatment, barefoot walking, choice of footwear and grade of ulcer. Regular inculcation of health education and boosting self-care management during treatment will reduce the burden of this disease and reduce long term complications.

Keywords: care practices, Diabetic foot, knowledge, safe footwear, ulcer grade

INTRODUCTION

Diabetes prevalence has been rising more rapidly in middle- and low-income countries[1, 2].The greatest absolute increase in the number of people with diabetes will be in India[3]. Diabetes, if not well controlled, may cause blindness, kidney failure, lower limb amputation and several other long-term consequences that impact significantly on quality of life. Diabetes appears to dramatically increase the risk of lower extremity amputation because of infected, non-healing foot ulcers[4]. Diabetic foot is a chronic complication as a result of poor diabetic control measures[5]. Foot complications in diabetes are one of the main reasons for leg or toe amputation. This is one of the main reasons for hospital admission of diabetic patients[6]. Neuropathy, mechanical stresses, and angiopathy are the major etio-pathological factors in the development of foot ulcers in people with diabetes[7]. A recent study from India reported that the cost of diabetes care for a patient with foot ulcers was more than 4 times higher (INR 19 020; US$409) than that for a patient without foot ulcers (INR 4493; US$97)[8].

It has been observed that the prevalence of foot problems such as dry skin, heel fissures, ingrown toe nails and plantar callus was significantly high in patients with poor educational status[9]. Sociocultural practices like barefoot walking indoors and in religious places, lack of adequate knowledge on foot care practices and use of improper or ill-fitting footwear have been identified as significant contributors of diabetic foot problems[10]. Habits such as smoking further escalate the problem by causing peripheral vascular disease and increasing the risk of neuropathy[9]. Poor knowledge of foot care and poor foot care practices were identified as important risk factors for foot problems in diabetes[11]. The recurrence of foot ulceration, despite careful patient education, is frustrating for management[12]. Education is essential at every visit, for evaluation of feet[11-13]. Therefore this study was designed with the objectives to assess the knowledge of diabetic foot practices and find association with socio-demographic variables in patients visiting a tertiary care hospital in Uttar Pradesh.

MATERIAL & METHODS

It was a Hospital based cross-sectional study conducted a Teerthankar Mahaveer Medical College & Research Centre, Moradabad, India for a period of 7 months, from March, 2016 to September, 2016. Moradabad is a city in North India with an approximate population of 4,772,006 according to Census 2011 and the present Hospital provides tertiary care to the population at large. A number of studies show that the incidence of Diabetes Mellitus in the area is increasing[1, 5]. Therefore, we took clinically diagnosed adult (>18 years) patients of Diabetes Mellitus type II visiting the Surgery and Medicine OPDs who were suffering from a foot ulcer as a study subject in the study. Non-probability purposive sampling technique was used for selection. After a thorough Literature review[11-20], the prevalence of correct knowledge of Diabetic Foot wound care practices was found to be ranging from 40-60%, As no similar study had been undertaken in the area, we took the expected prevalence of correct knowledge regarding Diabetic Foot wound care to be 50%, alpha 5% and chance error ±15%, the sample size worked out to be 44.4. Further, taking a non-response rate of 10%, we finally took a sample of 50 patients. We obtained written consent from all interviewed patients after explaining the purpose of the study. Pre-tested and semi-structured Questionnaire adapted from the study by Chellan et al[20] and validated by the Faculty members at Department of Community Medicine, Teerthankar Mahaveer Medical College & Research Centre was used. The first part of structured questionnaire consisted of information on socio-demographic variables of the patients, family history, personal, present and past history of Diabetes Mellitus and the type of footwear they were using. They were asked if they had received any prior information on the subject from any source. The ulcer was examined and graded according to University of Texas Diabetic Wound Classification 2015[21] (table 1).

Table 1: Grades according to University of Texas Diabetic Wound Classification 2015

Grade	Description
Grade 0	Epithelialized wound
Grade 1	Superficial wound
Grade 2	Wound penetrates to tendon or capsule
Grade 3	Wound penetrates to bone or joint

*http://www.fpnotebook.com/surgery/exam/UnvrstyOfTxsDbtcWndClsfctn.ht

For the purpose of this study, footwear was classified[11] as safe (bare foot, open chappals or sandals with forking, straps without back support, leather shoes without laces), and unsafe (straps with back support, leather shoes with laces, sports or canvas shoes and orthotic shoes). The second part of the questionnaire had information on knowledge and there were 10 questions in total (table 2).

Statistical Analysis: Data was analyzed using Statistical package for social sciences (SPSS) version 23.0 (IBM, Chicago, USA). Descriptive statistics as well as simple proportion were calculated for the data. Chi-square, Fisher Exact test, t test and binary logistic regression analysis were applied wherever applicable. The value of $p<0.05$ was considered as significant for this study.

Ethical Issues: Permission from the Institutional Ethics Committee, Teerthankar Mahaveer Medical College & Research Centre, Teerthankar Mahaveer University, Moradabad, India

RESULTS

Socio-demographic Profile of study participants: The mean age of the study population was 59.86 years (S.D. 12.48) and majority belonged to the age group of more than 60 years. 24 (48%) patients belonged to the rural areas while 26 (52%) belonged to the urban areas. 38 (76.0%) were males and 12 (24.0%) females. 21 (42%) were Hindu by religion, 25 were Muslims (50.0%) and 4 (8%) belonged to other religions. A majority of the patients (48%) were living in joint families. Majority of the patients were retired/ housewife or unskilled workers and illiterate by education. 5 (10%), 34 (68%) and 11 (22%) patients belonged to the upper, Middle and Lower class as classified by Modified B. G. Prasad Classification (2014)[23].

Knowledge of Diabetic Foot ulcers and self-care practices: The patients were asked questions to assess their knowledge of diabetic foot care practices. As seen in table 2, the difference in the correct and incorrect knowledge of Diabetes Mellitus was found to be significant (t=-3.6, p<0.05). Among the questions, more than 50% of the patients knew about the etiology of Diabetic foot ulcer, being caused by reduced sensations (54%), reduced blood flow (56%) and infection (54%). For the rest of the questions as described in table 3, correct knowledge was found in less than half of the patients.

Knowledge score and correlation with socio-demographic variables: The knowledge score was calculated as score "1" for every correct response and "0" for incorrect response. The total score was categorized as satisfactory when the score was more than 5. Among the significant findings, age stratification showed that patients of the age group 41-50 possessed the best knowledge score. Education level of Intermediate and above (OR 1.58, 95% CI 1.137-2.481), previous receipt of any information on care practices from a registered practitioner/ Institution (OR 18.857 , 95% CI 1.138-19.835) and good compliance towards the treatment (OR 4.75, 95% CI 3.274-108.62) were found to be significantly associated with good knowledge scores. Other variables such as sex, area of residence, work involving excessive use of feet, type of family, socio-economic status, addiction, type of Diabetes Mellitus (I/ II), family history of Diabetes Mellitus, duration of Diabetes Mellitus, grade of ulcer, type of footwear, co-morbidities present and other complications of Diabetes Mellitus were not found to be significant (p<0.05) (table 3).

Table 2: Knowledge of Diabetic Foot self-care practices

Questions asked to assess knowledge of diabetic foot care practices	Participants (%)	
	Correct	Incorrect
Do all patients with diabetes develop reduced blood flow in their feet?	7 (14)	43 (86)
Do all patients with diabetes develop lack of sensations in their feet?	11 (22)	39 (78)
Do all patients with diabetes develop foot ulcers?	15 (30)	35 (70)
Do all patients with diabetes develop gangrene?	23 (46)	27 (54)
Were you given any information regarding foot care?	10 (20)	40 (80)
Are you aware that smoking can reduce blood flow in your feet?	21 (42)	29 (58)
Do you know that if you have loss of sensation on your foot, you are more prone to have foot ulcers?	27 (54)	23 (46)
Do you know that if you have reduced blood flow on your foot, you are more prone to get foot ulcers?	28 (56)	22 (44)
Do you know that if you have foot infection, you will develop foot wounds?	27 (54)	23 (46)
Which do you think is appropriate way of trimming your nail? Cutting along the edges/cutting straight through?	19 (38)	31 (62)

t = -3.6, df = 18, p (one-tailed)= 0.001, (two-tailed)= 0.002

DISCUSSION

The higher incidence of foot ulceration in men as seen in our study is in keeping with referral patterns to specialist diabetic foot clinics[24-26]. A study was conducted to assess the awareness and knowledge of diabetes in Chennai among the self-reported diabetic subjects and showed that only 22.2% of the whole population and 41.0% of the known diabetic subjects were aware that diabetes could be prevented[27, 28]. Similar to the results obtained in our study, the knowledge of the role of obesity and physical inactivity in this study was very low, with only 11.9% of study subjects reporting these as risk factors for diabetes and 19.0% of whole population and 40.6% of self-reported diabetics were aware about complications[27]. The study by Chandalia et al (2008)[11] showed that 44.7% patients of diabetes had not received previous foot care education, 0.6% walked barefoot outdoors, 4.7% patients gave history of foot ulceration in the past and the total average score in diabetics was 57% indicating that there was scope for improving knowledge about prevention of diabetic foot disease. Similar poor knowledge score result was found in a study done in Nepal[29]. A study done in New Castle showed that there was a positive correlation between the score and having received advice on foot care (6.9 versus 5.4, p=0.001)[30]. Our study showed an odds of nearly 19 (95% CI 3.274-108.62) which re-highlights that massive diabetes education programmes are urgently needed both in urban and rural India[27]. The present study describes how the deficiencies in knowledge was related to illiteracy (p=0.001) and treatment compliance similar to other studies done in India.

Table 3: Knowledge score and correlation with socio-demographic variables

Socio-demographic variables	Knowledge score		†p value	Odd's Ratio	95% CI
	Not Satisfactory Score<=5 (%)	Satisfactory Score>5 (%)			
Age (in years)					
<40	4 (100.0)	0 (0.0)	**0.028**	1 (ref)	
41-50	3 (50.0)	3 (50.0)		1.273	0.214-7.581
51-60	14 (93.3)	1 (6.7)		0.091	0.010-0.802
>60	14 (56.0)	11 (44.0)		0.786	
Sex					
Male	8 (66.7)	4 (33.3)	0.518	1.23	0.31-4.92
Female	27 (71.1)	11 (28.9)		1 (ref)	
Area of Residence					
Rural	16 (66.7)	8 (33.3)	0.426	1.38	0.40-4.56
Urban	19 (73.1)	7 (26.9)		1 (ref)	
Work involving excessive use of feet					
Yes	13 (68.4)	6 (31.6)	0.546	1.128	0.327-3.898
No	22 (71.0)	9 (29.0)		1 (ref)	
Education (Highest level attained) ‡					
Illiterate	20 (100.0)	0 (0.0)	**0.001**	1 (ref)	
Primary/ Middle/ High School	9 (56.2)	7 (43.8)		0.000	
Intermediate and above	6 (42.9)	8 (57.1)		1.58	1.137-2.481
Type of family					
Nuclear	12 (75.0)	4 (25.0)	0.71	1 (ref)	
Joint	17 (70.8)	7 (29.2)		0.5	0.09-2.7
Living alone	6 (60.0)	4 (40.0)		0.62	0.13-2.8
Socio Economic Class§					
Upper	4 (80.0)	1 (20.0)	0.42	1 (ref)	
Middle	22 (64.7)	12 (35.3)		1.131	0.8-16.3
Lower	9 (81.8)	2 (18.2)		2.46	0.45-13.2
Addiction (Smoking/ tobacco chewing/ both)					
Yes	25 (73.5)	9 (26.5)	0.32	0.600	0.17-2.13
No	10 (62.5)	6 (37.5)		1 (ref)	
Type of DM					
I	13 (86.7)	2 (13.3)	0.08	1 (ref)	
II	22 (62.9)	13 (37.1)		0.26	0.05-1.34
Family History of DM | |					
Yes	25 (73.5)	9 (26.5)	0.318	0.60	0.169-2.13
No	10 (62.5)	6 (37.5)		1 (ref)	
Duration of DM					
<1 year	1 (50.0)	1 (50.0)	0.22	1 (ref)	
1-5 years	12 (92.3)	1 (7.7)		2.000	0.90-44.35
6-10 years	16 (61.5)	10 (38.5)		0.167	0.014-1.963
>10 years	6 (66.7)	3 (33.3)		1.250	0.254-6.162
Received any information on care practices previously					
Yes	2 (20.0)	8 (80.0)	**0.000**	18.857	3.274-108.62
No	33 (82.5)	7 (17.5)		1 (ref)	
Treatment Compliance					
Taking regularly	16 (57.1)	12 (42.9)	**0.025**	4.75	1.138-19.835
Non- Compliant	19 (86.4)	3 (13.6)		1 (ref)	
Grade of Diabetic Foot ulcer¶					
Grade 1	7 (70.0)	3 (30.0)	0.460	1 (ref)	
Grade 2	12 (75.0)	4 (25.0)		2.000	0.090-44.350
Grade 3	11 (78.6)	3 (21.4)		0.167	0.014-1.963
Grade 4	5 (50.0)	5 (50.0)		1.250	0.254-6.162
Type of footwear					
Safe	4 (44.9)	5 (55.6)	0.07	3.875	0.868-17.29
Unsafe	31 (75.6)	10 (24.4)		1 (ref)	
Co-morbidities present					
Hypertension	10 (62.5)	6 (37.5)	0.625	1.68	0.399-7.075
Obesity **(BMI>40)	7 (87.5)	1 (12.5)		0.400	0.039-4.115
Cardio vascular Disease	2 (66.7)	1 (33.3)		1.400	0.103-19.012
Absent	16 (69.5)	7 (30.5)		2.800	0.307-25.524
Other Complications of Diabetes Mellitus present (micro/ macro-vascular)					
Yes	6 (60.0)	4 (40.0)	0.341	1.758	0.425-7.441
No	29 (72.5)	11 (27.5)		1 (ref)	

†Chi-square test/ Fisher exact probability test; ‡Adapted from Kuppuswamy's Socioeconomic Status Scale (2016)[22]; §Modified B. G. Prasad Classification (2014) [23]; | |Parents/ siblings/ first degree relatives; **Body Mass Index= Weight in Kilograms/ (Height in centimeters) [2]; CI=Confidence Interval

As seen in table 1, 42% patients in our study were aware that smoking can increase the proneness to ulceration as against 52.4% reported by Pollock et al[30]. Knowledge of healthy foot care practices like appropriate nail trimming and foot drying are important in the prognosis of Diabetic foot ulcer[31-33]. A number of studies conducted throughout the world show poor awareness about diabetes and its complications among diabetic patients which influences the progression of diabetes, although it being largely avoidable [28-38]. Usually patient's priorities about foot wear selection are dependent on social, cultural and climatic conditions[11]. Our study showed that safe footwear had an odds of nearly 4 (95% CI 0.868-17.29) against unsafe footwear for a satisfactory knowledge of Diabetic foot care practices, however this was not found to be significant. It is mandatory on the health care provider to control these modifiable risk factors in order to prevent development of complications in diabetic patients with foot ulcers and improve the quality of life[38-40]. The small sample size of the study (n=50) may be a limitation to this study.

CONCLUSION

The present study reflects the poor level of knowledge regarding Diabetic foot practices among the patients. It highlights the importance of largely neglected variables such as compliance to treatment, barefoot walking, choice of footwear, progress and grade of ulcer. The knowledge about the role of other non-communicable diseases as co-morbidities in Diabetes is very poor and needs to be stressed upon for decreasing the overall morbidity and mortality from non-communicable diseases. Emphasis should be laid on these deficient areas during health education and misconceptions should be cleared. As seen in the present study, males with low education can be targeted for intervention. These findings can be used to guide a health education program on foot care for all patients of Diabetes Mellitus.

Recommendations: We recommend Clinic based integration of Health programmes on Diabetes and awareness activities in the community to reach each and every patient of Diabetic foot ulcer. Regular inculcation of health education and boosting self-care management during treatment will reduce the burden of this disease and reduce the long term complications. The information gained on the knowledge and practices regarding foot care can aid health care providers and policy makers to develop targeted self-management education programs for people with diabetes.

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