# Knowledge Assessment and Patient Counseling on Diabetic Foot Care

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ABSTRACT

Diabetic foot is a chronic complication as a result of poor diabetic control measures. Foot complications in diabetes are one of the main reasons for leg or toe amputation. The education of patient is extremely important to reduce the risk factors for lower extremity complications. The study Protocol was approved by Institutional Review Board of Kovai Medical Center and Hospital, Coimbatore. Patient knowledge regarding diabetic foot care was assessed by a structured questionnaire and categorized as good, satisfactory and poor depending upon the score. If the score was more than 70%, it was considered as good, 50- 70% as satisfactory and less than 50% as poor knowledge about foot care. Patient counselling on diabetic foot care was given to satisfactory and poor knowledge patients. Outcome of counselling was assessed through post questionnaires. About 28% patients had good knowledge, 29.3% had satisfactory knowledge and 42.7% had poor knowledge about foot care. Literacy status and income of patients had significant association with knowledge (p-value<0.001),(p-value<0.001) regarding foot care. Sex, age and history of foot infections had shown no significant statistical association. Patient counselling effectiveness was assessed and had highly significant (p=0.0001) improvement in knowledge. The awareness and attitude regarding the diabetic foot care is poor among the diabetic patients. Through the well structured foot care education by a clinical pharmacist have a significant impact in the prevention of recurrent foot infections and complications which may lead to amputation due to the lack of diabetic foot care knowledge.

## INTRODUCTION

Diabetic foot is a chronic complication as a result of poor diabetic control measures[1]. . The diabetic foot has an overall impact on the social and economics of the families, health system and society as a whole in both developing and developed countries. The major complications such as diabetic neuropathy and nephropathies, peripheral vascular disease, diabetic foot ulcers and limb amputations are seen twice as much in diabetic compared to non diabetic patients affecting 30% of those aged 40 or more. Among the complications of diabetic mellitus, the diabetic neuropathy is considered as a most common cause to the development of lower limb ulcers among 50% of all diabetic patients over 60 years[2].

Foot complications in diabetes are one of the main reasons for leg or toe amputation. Peripheral and nerve vessels disorders leads to foot ulcer and superadded infection which causes foot gangrene and other complications. This is one of the main reasons for hospital admission of diabetic patients[3].

The education of patients and their family members is extremely important to reduce the risk factors for lower limb morbidity and prevent limb amputation. The recurrence of foot ulceration, despite careful patient education, is frustrating for management[4]. Education is essential at every visit, for evaluation of feet[5]. Information imparted might include advice on importance of maintaining good glycemic control, exercise, diet modification and quit smoking to avoid vascular risk [6].

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## MATERIALS AND METHODS

In this prospective observational study patients who were diagnosed with Type I and II Diabetes mellitus were included and the patients who do not wish to complete the questionnaire, those with cognitive impairment, visual or hearing loss were excluded. The study protocol was approved by Institutional Review Board of Kovai Medical Centre and Hospital, Coimbatore. Data was collected by providing diabetes foot care questionnaire which consisted of knowledge assessment in the prevention of diabetic foot among patients with diabetes mellitus.

The dependent variable of the study was knowledge regarding foot care in diabetes and the independent variables were literacy status, monthly income, age, sex and history of foot infection. The respondents were interviewed by The American College of Physicians Diabetic Foot Care Questionnaire.

There were 15 Yes/No type questions and each question carries 1 mark for correct response and zero mark for wrong response. Good knowledge patients have a score of 11-15 (> 70%), satisfactory patients with a score of 8-10 (50 -70%) and poor knowledge patients with a score of <8 (< 50%), based on the scores patients are categorized as good, satisfactory and

poor knowledge patients. Patient counselling regarding disease conditions, complications, smoking, foot wear, nail care, foot care and exercises were given to the selected patients with poor and satisfactory knowledge. Diabetic foot care brochures were prepared from American Diabetic Association foot care guidelines and were given to patients. The outcome of education was measured through post questionnaires.

Data was analyzed by using Graph Pad Prism 5.04 software. Simple frequency distribution tables have to be generated for dependent and independent variables. Chi-square test was applied to find out statistical significance of socio-economic factors on knowledge regarding foot care in diabetic patients. Outcome of the study was analyzed from pre and post questionnaires by paired't' test. Values of $P<0.05$ was considered statistically significant.

## RESULTS

A total of 150 diabetic patients were included in our study during a period of six months. The demographic detail among the subjects reveals that 91(60.7%) were males while 59 (39.3%) were females. The mean age of the total population was 55.85±10.39. The mean age of males and females were 56.39 ±11.28 and 55.61 ± 10.6 respectively.

Among the subjects 23(15.3%) had an income of <5000, 89(59.3%) had 5000-10000 per month and 38(25.3%) had their income more than 10000 per month. Based on the literacy status 42(28%) of subjects were above matric, 52(34.7%) were matric and 56(37.3%) were under matric. Patients were asked about their smoking habits 125(83.4%) were non-smokers and 25(16.7%) were smokers. Based on foot wear only 5(3.3%) wore shoes, 118(78.7%) wore sandals, 22(14.7%) wore both and 5(3.3%) walk in bare foot. About 87(58%) subjects had a previous history of foot infections. The management of diabetes mellitus was noted for each patient, 107(71.3%) were taking oral hypoglycemic agents, 6(4%) were on insulin, 33(22%) on oral hypoglycemic agents with insulin and 4(2.7%) were on life style modifications.

A total of 115 patients (76.7%) knew the importance of keeping the blood glucose level within normal limits to prevent themselves from its complications. The knowledge regarding foot care is approximately same for most of the questions asked. However there was a marked difference for about use of talcum powder to keep the interdigital spaces dry, lotion application on the feet interdigital spaces, checking temperature of water before using, daily change of socks, inspection of feet once a day by respondents and warning signs for consultation (Table-1).

Among the patients 42(28%) had good knowledge, 44(29.3%) had satisfactory and 64(42.7%) had poor knowledge regarding diabetic foot care (Table-2).

**Table 1: Questions determining the knowledge about foot care.**

| S.No | Questions asked to determine the knowledge about foot care | Knowledge |
|---|---|---|
| 1 | Importance of taking antidiabetic treatment to prevent complications | 115 (76.7%) |
| 2 | Daily washing the feet | 131 (87.3%) |
| 3 | Using warm water for washing/bathing | 81 (54%) |
| 4 | Checking temperature of water before using | 54 (36%) |
| 5 | Drying the feet after washing | 71 (47.3%) |
| 6 | Talcum powder usage for keeping interdigital spaces dry | 40(26.7%) |
| 7 | Keeping skin of the feet soft to prevent dryness | 78 (52%) |
| 8 | Lotion not to be applied in the interdigital spaces | 47 (31.3%) |
| 9. | Daily change of socks | 58 (38.7%) |
| 10. | Trimming nails of feet straight with care | 80 (53.3%) |
| 11. | Inspection of feet once a day by respondents | 55 (36.7%) |
| 12. | Wearing comfortable coat shoes | 95 (63.3%) |
| 13. | Checking the shoes from inside before wearing | 93 (62%) |
| 14. | Not walking bare foot | 142 (94%) |
| 15. | Warning signs for which consultation is required | 56 (37.3%) |

**Table 2: Percentage scoring of knowledge about foot care among the study population**

| Scoring (Out of 15) | Knowledge |
|---|---|
| >70% (Good) (11-15) | 42 (28% ) |
| 50 – 79% (Satisfactory) (8-10) | 44 (29.3%) |
| <50% (Poor) (<8) | 64 (42.7%) |
| Total150 | (100%) |

The association between demographic variables and foot care knowledge was found out by using chi-square test. In association with sex and knowledge, 26(28.6%) male patients had good, 26(28.6%) had satisfactory and 39(42.86%) had poor knowledge. In females 16(27.1%) had good, 18(30.5%) had satisfactory and 25(42.4%) had poor knowledge. The chi-square value obtained was 0.0740. Sex was not significantly associated in relation to knowledge ($p=0.9633$) regarding foot care.

Subjects under the age group 31-45 years, 20(37.9%) had good, 7(24.2%) had satisfactory and 11 (37.9%) had poor knowledge. The age group of 46-60 years shows that 20 (29.4%) had good, 21 (30.9%) had satisfactory and 27(39.7%) had poor knowledge. Under the age group 61-70 years, 11(20.8%) of them had good, 16(30.2%) had satisfactory and 26 (49%) had poor knowledge. The chi-

square value obtained was 3.199 (p=0.05252) which has statistically no association with knowledge regarding foot care.

Regarding income and knowledge on those subjects with a monthly income of <5000, 5(21.7%) had good, 5(21.7%) had satisfactory and 13(56.6%) had poor knowledge. Those with monthly income 5000-10000, 10(11.2%) of them had good, 33(37.1%) had satisfactory and 46(51.7 %) had poor knowledge. On patients with income >10000, 27(71%) of them had good, 6(15.8%) had satisfactory and 5(13.2%) had poor knowledge. The chi-square value obtained was 49.55 (p= 0.0001) which is highly significant. Income per month has shown statistical association with the knowledge regarding foot care.

Among the subjects who are above-matric, 27(64.3%) had good, 10(21.4%) had satisfactory and 5(14.3%) had poor knowledge. In matric subjects 10(19.2%) had good knowledge, 22(42.3%) had satisfactory and 20(38.5%) had poor knowledge. It was found that 5(8.9%) of under-matric subjects had good, 13(23.2%) had satisfactory and 38(67.9%) had poor knowledge. It shows a chi-square value of 49.52, the role of education has shown an impact on the knowledge (p=0.0001) regarding foot care.

Subjects with a history of foot infection 24(27.6%) had good knowledge, 28(32.2%) had satisfactory knowledge and 35(40.2%) had poor knowledge. In subjects without history of foot infection 18(28.6%) had good knowledge, 16(25.4%) had satisfactory knowledge and 29(46%) had poor knowledge. History of foot infection has shown statistically no association with the knowledge (p= 0.646) regarding foot care (Table-3).

The poor and satisfactory patients were given education and evaluated with post questionnaires. Total number of patients involved in the post test was 30. The mean scores of pretest and post test on knowledge regarding diabetic foot care are 5.87 and 13.10 respectively. Standard deviation for pre and post were 2.80 and 0.99 respectively. The 't' test was used to find the difference between pre and post tests. It shows a't' test value of 13.33 for the difference between pretest and post test scores of diabetes mellitus patients and the foot care knowledge is highly significant at 0.0001 level (Table-4)

**Table 3: Relationship of knowledge about foot care with literacy status, monthly income, age, gender and history of foot infections.**

| Variable | Knowledge Scoring About Foot Care | | |
|---|---|---|---|
| **Literacy Status** | **>70%** | **50 – 70%** | **<50%** |
| Above Matric | 27 (64.3%) | 9 (21.4%) | 6 (14.3%) |
| Matric | 10 (19.2%) | 22 (42.3%) | 20 (38.5%) |
| Below Matric | 5 (8.9%) | 13 (23.2%) | 38 (67.9%) |
| **Chi-square = 49.52, P value = 0.0001** | | | |
| **Income** | | | |
| < 5000 | 5 (21.7%) | 5 (21.7%) | 13 (56.6%) |
| 5000 – 10000 | 10 (11.2%) | 33 (37.1%) | 46 (51.7%) |
| >10000 | 27 (71%) | 6 (15.8% ) | 5 (13.2%) |
| **Chi-square = 49.55, P value = 0.0001** | | | |
| **Age** | | | |
| 31 – 45 | 11 (37.9%) | 7 (24.2%) | 11 (37.9%) |
| 46 – 60 | 20 (29.4%) | 21 (30.9%) | 27 (39.7%) |
| 61 – 75 | 11 (20.8%) | 16 (30.2%) | 26 (49%) |
| **Chi-square = 3.199, P value = 0.5252** | | | |
| **Sex** | | | |
| Male | 26 (28.6%) | 26 (28.6%) | 39 (42.8%) |
| Female | 16 (27.1%) | 18 (30.5%) | 25(42.4%) |
| **Chi-square = 0.0740, P value = 0.9633** | | | |
| **History of Foot Infection** | | | |
| Yes | 24 (27.6%) | 28 (32.2%) | 35 (40.2%) |
| No | 18 (28.6%) | 16 (25.4%) | 29 (46%) |
| **Chi-square = 0.875, P value = 0.646** | | | |

**Table: 4: Shows 't' test for the mean difference between Pre and Post-test knowledge scores of subjects on diabetic foot care**

| S. No | Knowledge Assessment on Diabetic Foot care | N | MEAN | S.D | 't' value | p-value |
|---|---|---|---|---|---|---|
| **1.** | Pre-test | 30 | 5.87 | 2.80 | 16.79 | 0.0001 |
| 2. | Post-test | 30 | 13.10 | 0.99 | | |

## DISCUSSION

Diabetic foot care is essential for preventing complications of diabetic neuropathy and vascular insufficiency. A substantial proportion of diabetic patients are not offered adequate foot care, even in the presence of major risk factors for lower limb complications. In our study we found that patient knowledge and practices are strongly related to literacy status, income and foot care education.

In this study sex has no relationship regarding knowledge on foot care, the results in the above referred study conducted by **Seema Hasnain et al** are consistent with our study. Low scores of foot care were common in males than in females. However his can be explained on the basis that in this study there were more males than females[7]

Out of 150 patients majority were males and belong to the age group between 40-60 years. This shows that diabetic foot problem is mainly concentrated on elderly which increases the morbidity in them due to diabetes.

In a study conducted by **C. H. Ding et al** to assess the knowledge of diabetic and non diabetic patients in Klinik Kesihatan Seremban found that higher education and higher income were associated with higher knowledge score[9]. In this study also the income level which is mostly influenced by occupation has shown a positive relationship with foot care knowledge.

A study conducted by **Seema Hasnain et al** to assess the knowledge and practices of the diabetic patients on foot care. It concluded that literacy has significant association with the knowledge related to foot care. Regarding knowledge, only 29% respondents had good information (>70%) about foot care and formal education had a role in better knowledge about foot care[7]. In this study, there were 34 (46.5%) respondents who were illiterate and their score was <50% and 21(31.5%) respondents whose educational qualifications were matric and above matric, their score regarding knowledge was more than >70%[1] and almost same we found in our study.

This study reveals that those without foot ulcers have similar foot care knowledge to those with history of foot infection. Therefore the mere experience of going through the diabetic foot ulcer is not enough to bring change in patient's behavior. In a study conducted by **Murtaza Gondal et al** also reveals the same[8].

A study by **Fabio Batista et al** suggests by their study that a few diabetic patients were appear to be adequately educated on potential morbidity of diabetic foot ulcers or preventive measures to avoid foot specific morbidity[10] .The data's obtained from their study supports that coordinated program combining preventive foot specific patient education, skin and nail care and foot wear decrease the diabetic foot disease. The present study also reveals that patient education regarding these aspects of foot care in poor knowledge was improved. Thus the foot care education has shown an impact on knowledge regarding foot care.

Patients with diabetes who are at risk for the development of diabetic foot ulcers should receive ongoing foot-specific patient education. This information needs to be constantly reinforced, as retention drops with time. Preventive practices must be stressed and reinforced so those without foot ulcers should not develop ulcers. A diabetic educator should be present in each diabetes outpatient clinic and in medical indoor departments.

By our study we can say that to provide a better foot care to the diabetic patient a clinical pharmacist can play pioneer role which is much more important in today's health scenario in India where due to overload of patients in hospitals or clinics a physician is not able to provide these vital information due to his/her busy schedule.

## CONCLUSION

The awareness and attitude regarding the diabetic foot care is poor among diabetic patients. This may cause lower extremity complications and recurrent foot infections, if left untreated which ultimately lead to amputation. From the study it is identified that the well structured patient counseling by a clinical pharmacist regarding diabetic foot care can have a significant impact on the improvement of their knowledge.

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