International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

TITLE: XXX

Aswathy K A, Dr Ankit Singh
(Assistant Professor in the Department of Pharmacy Practice, Nehru College of pharmacy, Thrissur,
(Professor, JJT University, Rajastan)

Date of Submission: 15-02-2025 Date of Acceptance: 25-02-2025

ABSTRACT
Objective: To assess the knowledge and practice of foot care among patients with Diabetic foot ulcer patients.
Methodology: The study was conducted among 130 consecutive patients from the Department of Surgery, Government Medical college, Thiruvananthapuram and they were diagnosed with Diabetic foot ulcer and those who are willing were included in the study and those with cognitive impairment were excluded from the study.
Study Procedure:A written informed consent will be taken from the patient or caregiver in a prescribed format. Patient who met the inclusion criteria will be enrolled for the study. All information relevant to the study was collected from case records and direct interview with patient with the help of questionnaires.. Knowledge and practice of foot care was assessed using questionnaire based on recommendation by American Diabetics Association.
Conclusion: . Wound duration was identified as the only risk factor for MRSA infection in DFU. . Appropriate implementation of foot care strategies reduce the risk of amputation by 49%-85%.To achieve this effect, we must emphasize on awareness of foot care.
Key words: Diabetic foot ulcer, Knowledge, Leision ,Proportion, Practice, Wagner's Classification.

I. INTRODUCTION

Diabetes mellitus is a syndrome characterised by disordered metabolism and inappropriate high blood sugar resulting from either low level of hormone insulin or from abnormal resistance to insulin effect coupled with inadequate level of insulin secretion to compensate. Diabetes care account for up to 15% of the health care expenditure and 70- 80% of it is for the hospitalization due to complications.

Diabetic foot ulcer is one of the common complications of diabetes. WHO defines it as infection, ulceration and or destruction of deep tissues associated with neurological abnormalities and various degrees of peripheral vascular disease of lower limb. Foot problems in diabetic patients accounts for more hospital admission than other long term complications of diabetes and also resulting morbidity and mortality [1].
A clinical classification developed from a study of the natural history of the progressive foot breakdown used as the basis for comprehensive management.

ETIOLOGY

Recent studies have indicated multiple risk factors associated with the development of diabetic foot ulcer. These risk factors are as follows:

Gender, duration of diabetes longer than 10years, advanced age, high BMI and other co morbidities such as retinopathy, peripheral neuropathy, peripheral vascular disease, foot deformity, high plantar pressure, infections and inappropriate foot care [3].

PATHOPHYSIOLOGY

Neuropathy in DM manifests against motor, sensory and autonomic. Damage to the innervations of the leg muscle cause an imbalance between flexion and leg extension, resulting in deformity. Gradually it will cause skin damage that develops in to ulcers. Autonomic neuropathy lowers the activity of oil glands and sweat so that foot moisture is reduced and susceptible to injury. In peripheral arteries hyperglycemia causes endothelial dysfunction as well as decreased vasodilator production resulting in constriction. Hypertension and Dyslipidemia also contribute to occurrence of peripheral arterial disease. The explanation above will lead to occlusive arterial disease which then causes ischemia of the lower extremities and increases risk of ulcer[8].

CLINICAL PRESENTATION

Swelling, indurations, erythrema around lesion, local pain, palpable local warmth and

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

presence of pus.Infection is divided in to mild (superficial, inner and limited in size), moderate (deeper and wider), and severe (necroting fasciitis, gangrenous gas, ascending cellulitis, systemic toxicity or metabolic instability)[7].

RATIONALE BEHIND THE STUDY

Among various complication that are associated with diabetes foot disease is highly frequent being associated with significant morbidity, mortality and cost. Such information is important for policy makers to advocate for implementation of prevention and treatment recommendations.. Various studies shows that the knowledge and practice of foot care were poor among the patients with diabetics.

METHODOLOGY

STUDY DESIGN:

Cross-sectional study

STUDY SETTINGS:

Department of General surgery
Government Medical College, Thiruvananthapuram

STUDY PERIOD:

Study was done only after getting the clearance from Human Ethics Committee, Govt. Medical College, Thiruvananthapuram.

STUDY POPULATION:

Inclusion criteria:

1. Patients who are diagnosed with diabetic foot ulcer.
2. Patients who are willing to participate in the study.

Exclusion criteria:

2. Patient with cognitive impairment

SAMPLE SIZE: 130 Participants

SAMPLE SIZE CALCULATION:

Sample size is calculated using the formula:

$N = (Z1 - \propto/2 \times p \times q)^2 / d^2 P = 42.86\%$

$= (1.96)2 \times 42.86 \times 57.14 / (20/100 \times 42.86)2$

$Q = 100-P$

$= 130$

d^2 = degree of precision (20% of P)

STUDY VARIABLES:

Sociodemographic variables- age, gender, education, clinical features, Laboratory parameters, Treatment and other disease condition.

DATA COLLECTION TOOL:

1. Standard data collection form
2. Laboratory data
3. Patient case sheet
4. Questionnaire based on recommendation by American Diabetic Association

DATA COLLECTION TECHNIQUE:

1. Interviewing

STUDY PROCEDURE:

A detailed description regarding the study is given to the participants who met the inclusion criteria. Informed consent will be collected from the participants. The baseline measures including patient demographics, co- morbidities, and co-medication can be recorded in the prescribed format. All information relevant to the study can be collected from case records and direct interview with patient with the help of questionnaires.

STATISTICAL ANALYSIS:

- Data obtained will be entered in to the Microsoft Excel sheet. Statistical analysis was done by spss version 20.0.
- Qualitative variables was expressed in percentages.
- Quantitative variables were expressed in mean, standard deviation and confidence interval.
- Chi- square test was used to find out the association between selected variables.
- Bar and pie chart was used to present percentage distribution of selected variables in the study.

ETHICAL CONSIDERATION:

Ethical clearance was obtained from Ethics Committee of Government Medical College, Thiruvananthapuram. All data were kept confidential and was used for the purpose of this study only.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

II. RESULTS

A.SOCIO-DEMOGRAPHIC BACKGROUND

Table 1: Distribution of Patients according to age

Age in years	Percentage
45-55	32.7
56 - 65	36.8
66 - 75	22.2
>75	8.2
Total	100

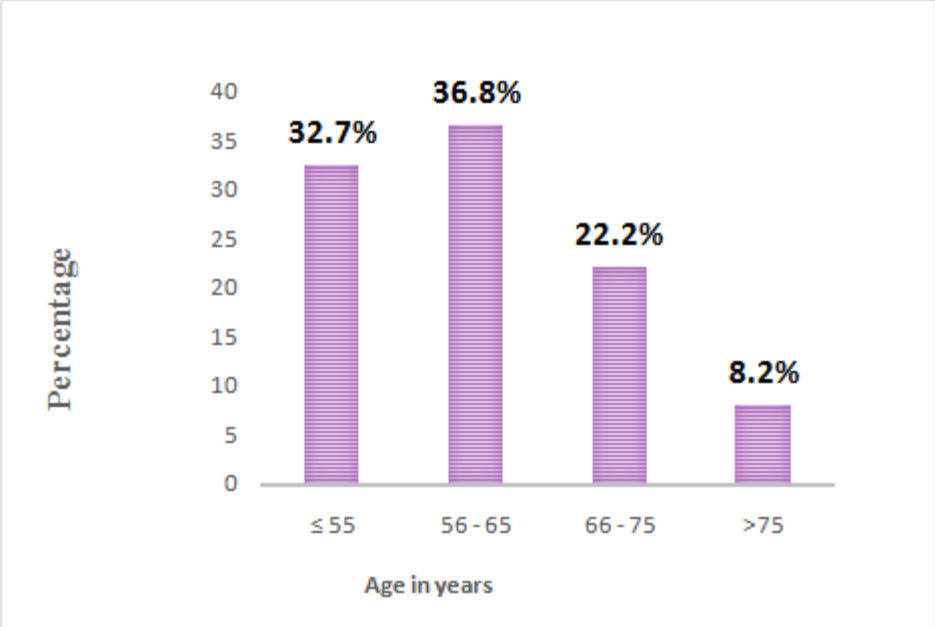

Figure 2: Percentage distribution of patients according to age

In our study majority of the patients (36.8%) belongs to 56-65years, 32.7% were in the age group of 45-55 years, 22.2% were in the age group of 66-75 years and only 8.2% were in the age group above 75 years.The mean age was found to be 60.88 ±10.4 years.

Table 2: Distribution of patients according to gender

Gender	Percentage
Male	67.3
Female	32.7
Total	100

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

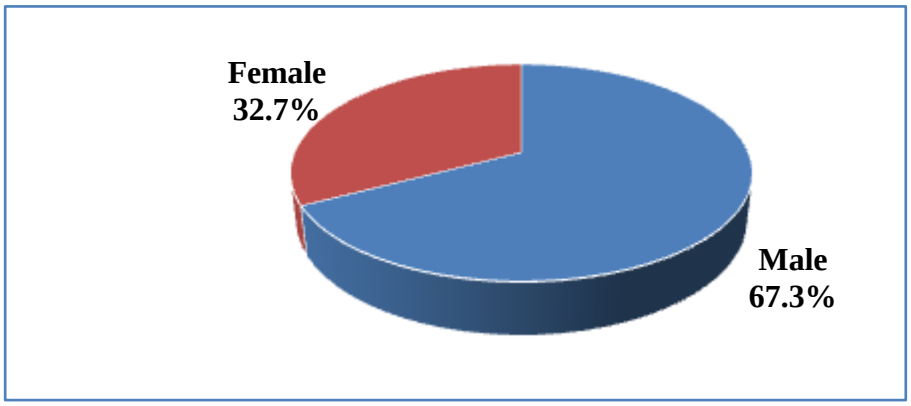

Figure 3: Percentage distribution of patients according to gender

Among the study population, 67.3% were males and 32.7% were females. From these results it was found that the disease were found more common in male population than in female population.

Table 3: Distribution of patients according to educational status

Education	Percentage
Illiterate	20.0
Primary	35.1
Middle school	15.8
High school	23.4
Graduate	5.8

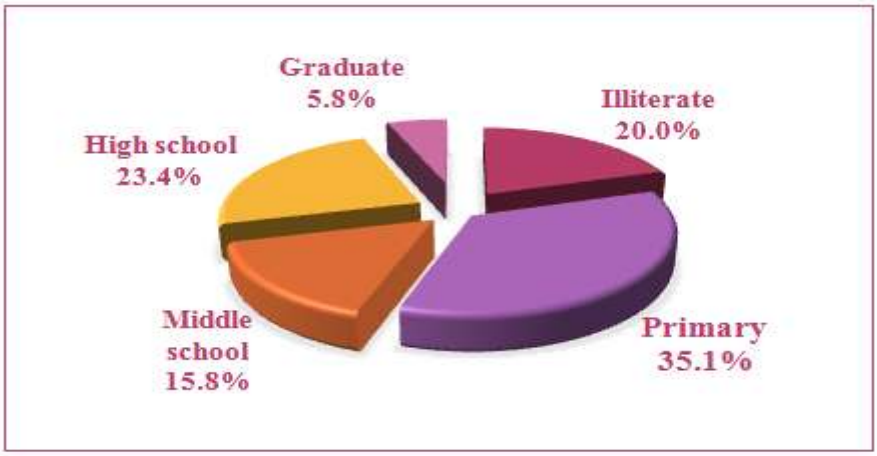

Figure 4: Distribution of patients according to educational status

According to modified Kuppusamy's socio- economic status scale it was observed that majority of patients had primary education 35.1%, 23.4% were with high school education, 15.8% with middle school level of education, 20.0% were illiterates and 5.8% with graduate level of education.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

SES	Percentage
BPL	84.8
APL	15.2
Total	100

Table 4: Distribution of patients according to the Socio-Economic Status

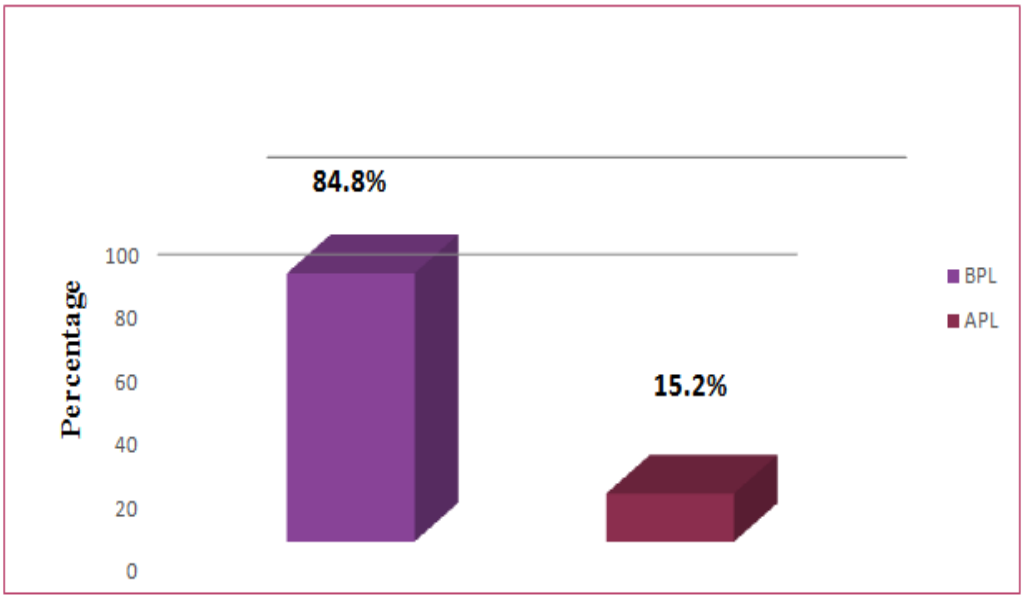

Figure 4: Distribution of patients according to Socio- Economic Status

According to modified Kuppusamy's socio-economic status, majority of patients belongs to BPL category (84.8%) and the remaining (15.2%) belongs to APL category**.**

Table 5: Distribution of patients according to the habit of smoking

Smoker	Percentage
No	49.1
Yes	50.9
Total	100

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

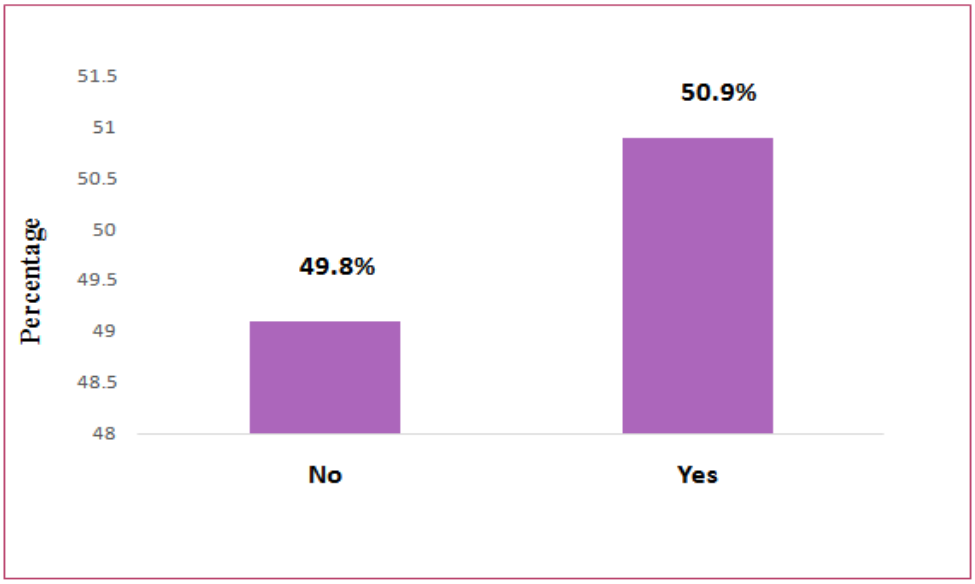

Figure 6: Distribution of patient according to the habit of smoking

In our study among 171 patients, 50.9% were smokers and 49.1% were non-smokers. Smoking is a risk factor for diabetic foot amputation**.** The above data shows that majority of patients had a smoking history. These results were supported by studies done by **Min Liu et.al.**

Alcoholics	**Percentage**
No	53.8
Yes	46.2

Table 6: Distribution of patients according to the habit of alcohol consumption

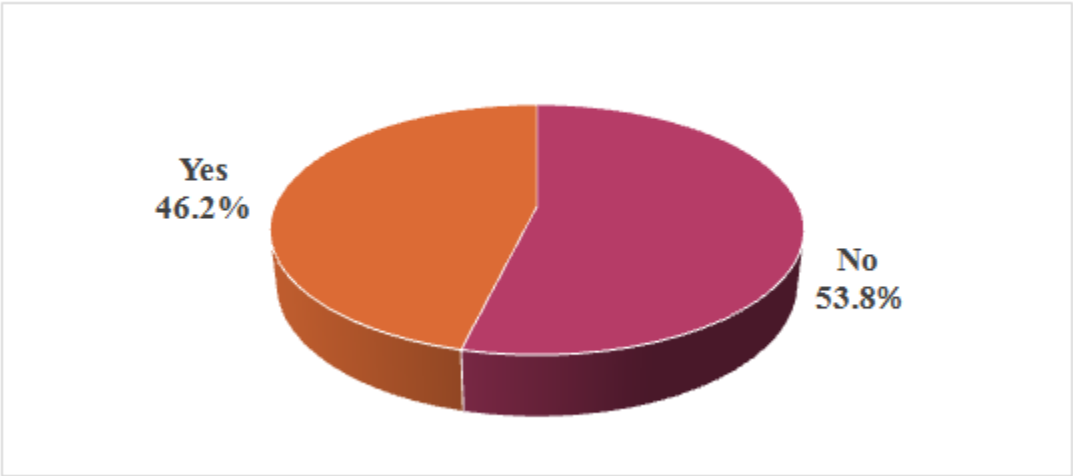

Figure 7: distribution of patients according to the habit of alcohol consumption

Above data shows that out of 171 patients 46.29% were alcoholics and 53.8% were non alcoholics. Theoretically alcohol intake has been noted to cause nerve damage which can results in

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

foot ulcer and amputations. In our present study 46.2% were alcoholics and these results complies with the study done by **Bergqvist et.al**.

Table 7: Distribution of patients according to previous history of Diabetic foot ulcer

Previous history of diabetic foot ulcer	Percentage
No	38
Yes	62

Figure 8: Distribution of patients according to previous history of Diabetic foot ulcer

In our study, 62.0% of the patients had relevant history of the disease and remaining 38.0% were not having any previous history of foot ulcer. Previous history of foot ulcer was found to be statistically associated with MRSA infection having Pearson correlation coefficient of 0.000

B. CLINICAL BACKGROUND

Table 8: Distribution of patients according to the duration of Diabetes Mellitus

Duration of Diabetes in years	Percentage
≤ 10	45.6
11-20	33.3
21 - 30	14.6
>30	6.4

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

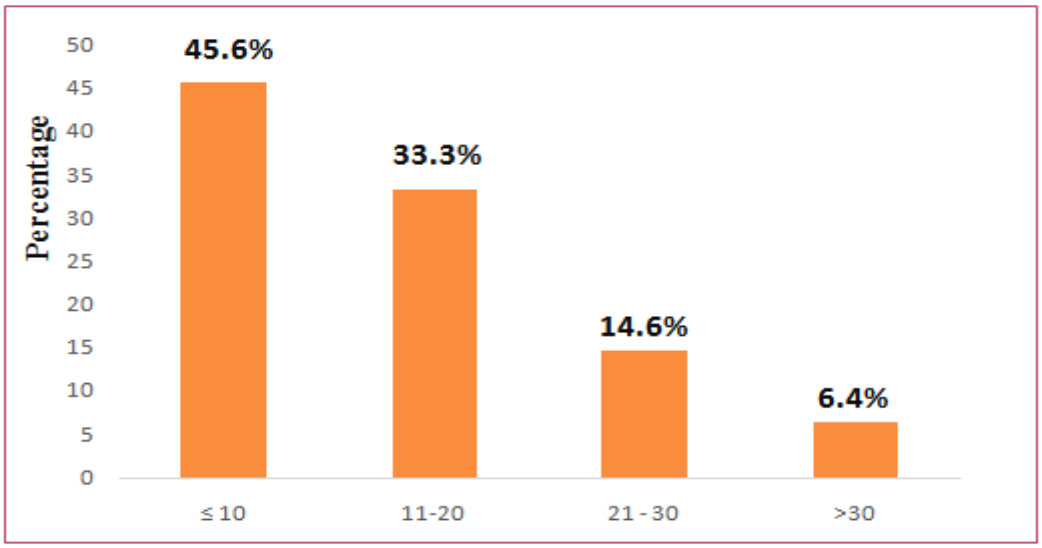

Figure 9: Distribution of patients according to duration of Diabetes Mellitus

In our study population, 45.6% of patients had Diabetes for a duration of less than or equal to 10 years, 33.3% had a duration of 11-20 years, 14.6% had a duration of 21-30 years and 6.4% had a duration of more than 30years**.**Mean duration was found to be 14.29 years and duration of Diabetes was a significant risk factor for Diabetic foot ulcer.The above results were supported by studies conducted by **Christopher et.al**.

KNOWLEDGE AND PRACTICE OF FOOT CARE

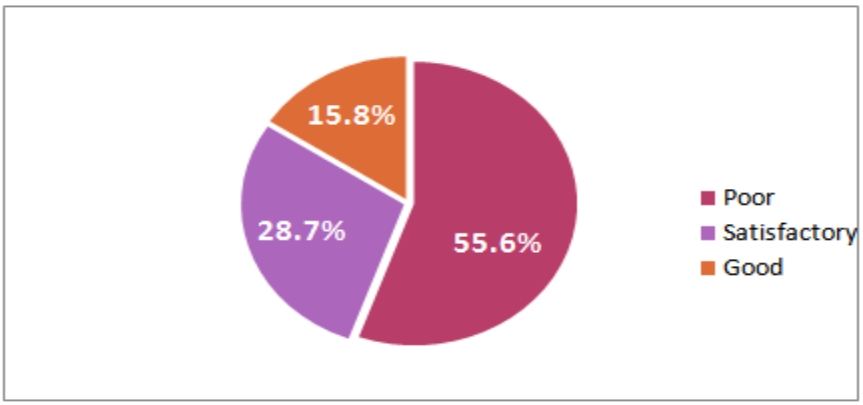

Figure 16: Distribution of patients according to their knowledge on foot care

Knowledge	percentage
Poor	55.6
satisfactory	28.7
Good	15.8

Table16:Distribution of patients according to their knowledge on foot care

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

Above graph shows that 55.6% scored Poor knowledge on foot care, 28.7% scored satisfactory knowledge on foot care and 15.8% scored Good knowledge on foot care

Practice of foot care	Percentage
Poor	49.1
Satisfactory	32.7
Good	18.1

Table 17: Distribution of patients according to their practice of foot care

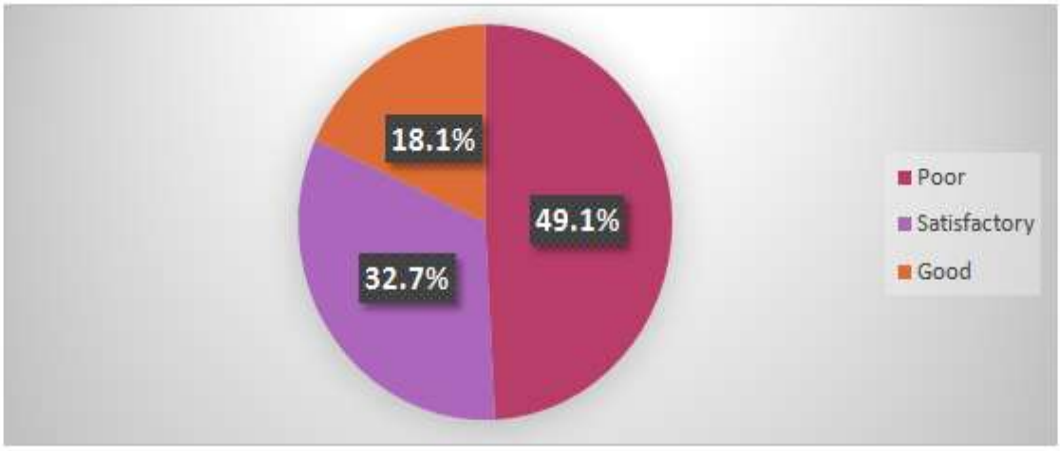

Figure 17: Distribution of patients according to their practice of foot care

In the study, it was found that out of171 patients 18.1% scored Good, 32.7% scored Satisfactory and 49.1% scored Poor on their practice of foot care.

Table 18: Distribution of age of the patients according to their knowledge on foot care

Knowledge	45-55	55-65	65-75	Above75
Poor	27.0%	39.0%	19.0%	7.0%
Satisfactory	17.0%	13.0%	13.0%	5.0%
Good	11.0%	7.0%	6.0%	2.0%

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

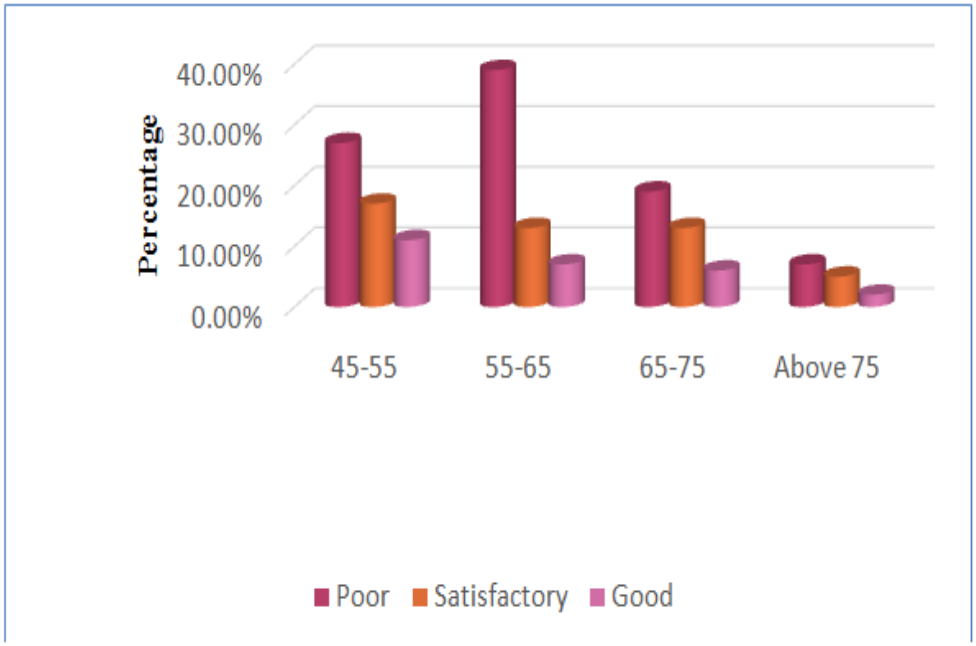

Figure18: Distribution of age of the patients according to their knowledge on foot care

In our study population, patients belongs to the age group of 55-65 scored Poor knowledge on foot care and patients belongs to the age group of 45-55 scored Good knowledge on foot care.

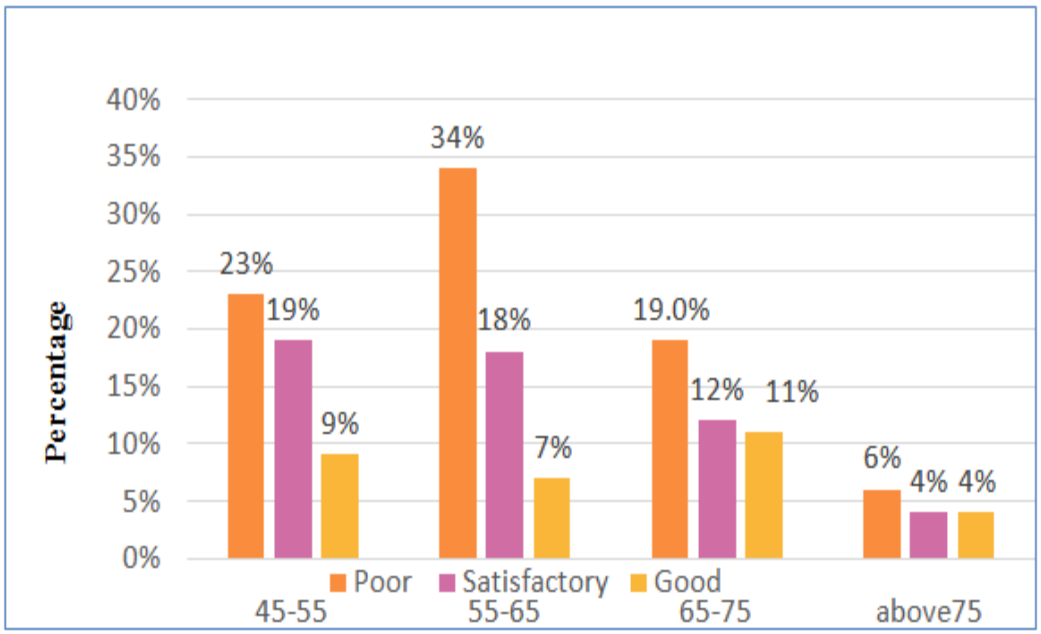

Figure 19: Distribution of age of the patients according to their practice of foot care

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

Practice of foot care	45-55	55-65	65-75	Above 75
Poor	23.0%	34.0%	19.0%	6.0%
Satisfactory	19.0%	18.0%	12.0%	4.0%
Good	9.0%	7.0%	11.0%	4.0%

Table 19: Distribution of age of the patients according to their practice of foot care

Among the study population, patients belongs to the age group of 55-65 scored Poor practice of foot care and patients belongs to the age group of 65-75 scored Good practice of foot care.

Checking inside shoes prior to wearing	Percentage
Yes	24.1
No	67.8

Table 20: Distribution of patients according to negative and positive responses to each question

In our study 36.2% inspect their foot daily.

Daily inspection of feet	Percentage
Yes	36.2
No	58.2

24.1% check inside shoes before wearing

Protection of feet from extremes of tempreture	Percentage
Yes	56.9
No	33.9

Among the study population it was found that 78.7% wash their foot daily.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

Proper trimming of toe nails	Percentage
Yes	33.9
No	55.7

Our study shows that only 33.9% trimmed their toenails correctly

Should not walk barefoot	Percentage
Yes	52.3
No	37.4

Among the population 52.3% were not walked as barefoot.

Know that should not smoke	Percentage
Yes	29.3
No	66.7

In our study, 29.3% knew that they should not smoke Cigarette

Blood glucose control	Percentage
Yes	81.0
No	12.6

In our study, 81.0% had put their blood glucose under control

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

Wear slippers outdoors	Percentage
Yes	36.8
No	32.7

36.8% wear slippers when they go outside

III. DISCUSSION

The study **entitled "Knowledge and practice foot care among patients with diabetic foot ulcer in a tertiary care teaching hospital**" was carried out in the department of General surgery, Govt. Medical College, Thiruvananthapuram for a period of six months. A total of 171 patients who satisfied the inclusion criteria were enrolled in the study.

A. SOCIO – DEMOGRAPHIC BACKGROUD

a. Age

In the study 36.8% of patients belongs to the age group of 56-65 years and the mean age was found to be 60.88±10.4 years. 32.7%were in the age group of 66-75 years and only 8.2% were in the age above75 years. As age increases the risk of diabetic foot ulcer also increases. The results were supported by the findings in the study conducted by **Shao-Hua Wang et.al**. In their study also majority of patients belongs to the age group of 56-65 years.

b. Gender

In our study it was found that majority of patients were males 67.3% and remaining 32.7% were females. These results were supported by the studies conducted by **Suryakala et.al**. In their study among 250 patients 64.4% were males and 35.6% were female showed that male population were affected by this disease than female population**.**In males cigarette smoking and peripheral neuropathy was found to be the important factors which differs both populations.

c. Education

In the study population, 35.1% of patients had primary education, 23.4% were with secondary education, 15.8% with high school level of education, 20.0% were illiterates and 5.8% with graduate level of education.

These findings were similar to the findings in the study conducted by**Hibah Alharbi et.al**.in their study out of 300 patients 36.9% had primary level of education.

d. Socio-Economic status

In our study, majority of patients belongs to BPL category (84.8%) and the remaining 15.2% belongs to the APL category. This is because the study was conducted in a tertiary care Government hospital were majority of patients were coming from low economic status and government provides them treatment and medication for free of cost.

e. Habit of smoking

Among the study population, 50.9% were smokers and 49.1% were non-smokers. Smoking diminishes tissue perfusion. This happens due to the nicotine present in the cigarette stimulates the sympathetic nervous system to release catecholamines which diminish tissue perfusion and cause hypoxia**.** These results were supported by findings in the study conducted by **Min Liu et.al.**

f. Habit of alcohol consumption

In our study it was found that out of 171 patients 46.29% were alcoholics and 53.8% were non alcoholics.

Theoretically alcohol intake has been noted to cause nerve damage which can results in foot ulcer and amputations..

g. Previous history of diabetic foot ulcer

In the study 62.0% of the patients have relevant family history of the disease and remaining 38.0% do not have any previous history.

h. Duration of Diabetes mellitus

In our study 45.6% of patients had diabetes for a duration of less than or equal to 10 years, 33.3% had a duration of 11-20 years, 14.6% had a duration of 21-30 years and 6.4% had a duration of more than 30years**.** Mean duration was found to be 14.29 years and duration of Diabetes was a significant risk factor for diabetic foot ulcer. The possible explanation might be due to the fact that diabetic patients for long time presumed to be

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1411-1425 www.ijprajournal.com ISSN: 2456-4494

at more risk due to the development of long term Diabetic complications such as Peripheral vascular disease, Neuropathy which could lead to the occurrence of foot ulcer.The above results were supported by findings in the study conducted by **Christopher et.al**

B. KNOWLEDGE AND PRACTICE OF FOOT CARE

a.Knowledge on foot care

In our study, 55.6% had Poor knowledge on foot care, 28.7% had Satisfactory knowledge on foot care and 15.8% had Good knowledge on foot care. The worst scored questions were those pertaining to daily inspection of foot, proper trimming of toe nails, awareness about special shoes for ulcer patients and these results were similar to the findings from the study conducted by **Shyam Kishore et al**.Foot ulcers and amputations can be reduced by increasing awareness of foot care. To achieve this effect we must emphasize on awareness of foot care.

b. Practice of foot care

In the study, it was found that among 171 patients 18.1% scored good , 32.7% scored satisfactory and 49.1% scored poor on their practice of foot care.Questions related to crossing of legs, walking barefoot scored poorly.Barefoot walking, particularly in the house is common in india. Diabetes foot care knowledge and practice have been found lacking to varying extremes in other studies from India. Patients with Diabetes should be warned about the chances of injury and ulcer associated with walking as barefoot as Peripheral neuropathy develops. Patients with poor knowledge and practices regarding Diabetic foot care have a higher incidence of foot complications including ulcers. Also foot care practices reduce common foot problems such as corns and callosities and facilitate healing of foot ulcers.

c. Knowledge on foot care on the basis of age

In our study,it was found that patients belongs to the age group of 55-65 have poor knowledge on foot care and patients belongs to the age group of 45-55 have good knowledge on foot care. These results were similar to the findings from the study conducted by **Pinakin et al**.

d. Practice of foot care on the basis of age

In the study population, patients belongs to the age group of 55-65 had poor practice of foot care and patients belongs to the age group of 65-75 had good practice of foot

IV. CONCLUSION

In our study, 171 patients with Diabetic foot ulcers were studied.

The clinical pharmacist who plays an important role in patient counseling about diabetic foot care and selecting the antibiotics which are rational.

Patient education regarding diabetic foot care is associated with reduced foot ulcers. Foot ulcers and amputations can be reduced by increasing awareness about foot care. Appropriate implementation of foot care strategies reduce the risk of amputation by 49%-85%.To achieve this effect, we must emphasize on awareness of foot care. Appropriate usage of antibiotics based on local antibiogram pattern can certainly help the clinician in reducing the burden of diabetic foot infections which ultimately reduces the rate of amputations.

REFERENCES

[1]. Aumiller WD, Dollahite HA. Pathogenesis and management of diabetic foot ulcers. Journal of the American Academy of PAs. 2015 May 1;28(5):28-34.

[2]. Chandrasekhar S, Muralidhar S. A study on the prevalence of risk factors and presence of diabetic foot ulcers in T2DM patients in KR Hospital, Mysuru. International Surgery Journal. 2017 Aug 24; 4(9):2983-6.

[3]. Goweda R, Shatla M, Alzaidi A, Alzaidi A, Aldhawani B, Alharbi H, Sultan N, Alnemari D, Rawa B. Assessment of knowledge and practices of diabetic patients regarding diabetic foot care, in Makkah, Saudi Arabia. Journal of Family Medicine and Health Care. 2017 Feb 18;3(1):17.

[4]. Kishore S, Upadhyay AD. Awareness of foot care among patients with diabetes attending a tertiary care hospital. The National medical journal of India. 2015 May 1;28(3):122-5

[5]. Shrestha TM, Aacharya RP, Shrestha R. Foot Care Knowledge and Practice among Diabetic Patients Attending General Outpatient Clinic in Tribhuvan University Teaching Hospital. Open Journal of Endocrine and Metabolic Diseases. 2017 Aug 25;7(08):163..

[6]. Muhammad-Lutfi AR, Zaraihah MR, Anuar-Ramdhan IM. Knowledge and practice of diabetic foot care in an in-patient setting at a tertiary medical center. Malaysian Orthopaedic Journal. 2014 Nov;8(3):22.
[7]. Patil P, Khadse R, Chavan S, Raut S. Bacteriological profile of diabetic foot infections. Ejpmr. 2018;5(6):631e5.
[8]. Wang SH, Sun ZL, Guo YJ, Yang BQ, Yuan Y, Wei Q, Ye KP. Meticillin-resistant Staphylococcus aureus isolated from foot ulcers in diabetic patients in a Chinese care hospital: risk factors for infection and prevalence. Journal of medical microbiology. 2010 Oct 1;59(10):1219-24
[9]. Son ST, Han SK, Lee TY, Namgoong S, Dhong ES. The microbiology of diabetic foot infections in Korea. Journal of Wound Management and Research. 2017 May 31;13(1):8- 12.
[10]. Eleftheriadou I, Tentolouris N, Argiana V, Jude E, Boulton AJ. Methicillin-resistant Staphylococcus aureus in diabetic foot infections. Drugs. 2010 Oct 1; 70(14):1785-97.
[11]. Wang SH, Sun ZL, Guo YJ, Yang BQ, Yuan Y, Wei Q, Ye KP. Meticillin-resistant Staphylococcus aureus isolated from foot ulcers in diabetic patients in a Chinese care hospital: risk factors for infection and prevalence. Journal of medical microbiology. 2010 Oct 1; 59(1Lavery LA, Fontaine JL, Bhavan K, Kim PJ, Williams JR, Hunt NA.
[12]. Risk factors for methicillin-resistant Staphylococcus aureus in diabetic foot infections. Diabetic foot & ankle. 2014 Jan 1; 5(1):23575.0):1219-24.
[13]. Viswanathan V, Jasmine JJ, Snehalatha C, Ramachandran A. Prevalence of pathogens in diabetic foot infection in South Indian type 2 diabetic patients. The Journal of the Association of Physicians of India. 2002 Aug;50:1013-6.
[14]. Kavitha KV, Tiwari S, Purandare VB, Khedkar S, Bhosale SS, Unnikrishnan AG. Choice of wound care in diabetic foot ulcer: a practical approach. World journal of diabetes. 2014 Aug 15;5(4):546.
[15]. Jayaprakash P, Bhansali S, Bhansali A, Dutta P, Anantharaman R. Magnitude of foot problems in diabetes in the developing world: a study of 1044 patients. Diabetic Medicine. 2009 Sep; 26(9):939-42.
[16]. Hasnain S, Sheikh NH. Knowledge and practices regarding foot care in diabetic patients visiting diabetic clinic in Jinnah Hospital, Lahore. JPMA.The journal of the Pakistan Medical Association. 2009 Oct;59(10):687.
[17]. George H, Rakesh PS, Krishna M, Alex R, Abraham VJ, George K, Prasad JH. Foot care knowledge and practices and the prevalence of peripheral neuropathy among people with diabetes attending a secondary care rural hospital in southern India.Journal of family medicine and primary care. 2013 Jan;2(1):27.
[18]. Chellan G, Srikumar S, Varma AK, Mangalanandan TS, Sundaram KR, Jayakumar RV, Bal A, Kumar H. Foot care practice–The key to prevent diabetic foot ulcers in India. The Foot. 2012 Dec 1; 22(4):298-302.
[19]. Dorrestein J A, Kriegsman D M, Assendelft.Patient education for preventing diabetic foot ulceration. Cochrane Database system Rev 2012; 10: CD001488.
[20]. Murugan S, Uma Devi P, Mani K R. Prevalence of Methicillin resistant Staphylococcus aureus among Diabetes patients with foot ulcers and their antimicrobial susceptibility pattern. Journal of Clinical and Diagnostic research; 2008; 2:979-984