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A prospective study on the prescription pattern of Antibiotics and oral hypoglycemic drugs among Hospitalized patients with diabetic foot ulcers

Neena Kirubakaran E.M*, Selva Kumar k, Rishi Raaj K., Yogavigneshwaran C.P.

Vels Institute of Science, Technology and Advance Studies

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Corresponding Author-

Neena kirubakaran E.M

neenakiruba123@gmail.com

Vels Institute of Science,
Technology and Advance
Studies

ABSTRACT:

Diabetic foot complications encompass neuropathy, ischemia, and infection-induced tissue breakdown. Individuals with diabetes carry a 20% high susceptibility to foot ulcers due to neuropathy. These ulcers, from peripheral neuropathy or arterial disease in diabetes mellitus (DM) patients, can lead to necrosis and gangrene. Importantly wound healing stands as the primary goal in treating diabetic foot ulcers (DFUs), with meticulous glucose control and suitable antibiotic administration.

This prospective observational study conducted at a tertiary care hospital investigated the prevalence and management of diabetic foot ulcers (DFUs) over six months. With 48 participants, comprehensive data was collected on demographics, medical histories, investigations, and treatments. In treating DFUs, Inj. Cefotaxime was prominent (52.17%) for its broad antibacterial efficacy, and Inj. Metronidazole addressed anaerobic infections and Clostridium difficile. In insulin therapy, Inj. Degludec, a long-acting option, enabled sustained glycemic control, distinct from shorter-acting insulins. Among oral hypoglycemic agents, T. Metformin prevailed (67.31%) due to its lower hypoglycemia risk. Overall, the study underscores the dual importance of glycemic control and appropriate antibiotics in DFU management, highlighting the efficacy of Inj. Cefotaxime and Inj. Metronidazole, and the safety of T. Metformin. Tailored strategies combining glycemic and antibiotic control are advocated for optimal DFU care.

1. Introduction: Diabetes mellitus (DM) is a metabolic disorder caused by a defect in

insulin action, insulin secretion, or both, the diabetic foot is a group of diseases in which

neuropathy, ischemia, and infection cause tissue breakdown, which can lead to illness and even amputation.¹ Of people living with diabetes, 20% are at high risk of foot ulceration as a result of neuropathy. Diabetic foot ulcers are an injury to all layers of skin, necrosis or gangrene that usually occur on the soles of the feet, as a result of peripheral neuropathy or peripheral arterial disease in diabetes mellitus (DM) patients. The main goal of treating DFU is to get the wound to heal as quickly as possible. In the care of DFU, one of the key objectives is to achieve wound closure in the shortest amount of time possible. Controlling glucose levels is the most critical aspect of metabolic management for patients with DFU. DFU is almost always brought on by inadequate management of blood sugar levels.² In an acute manifestation of diabetic foot infection (DFI), there is sometimes a delay in identifying the causative organism, which may compel the prescription of an empirical antibiotic.³ Antibiotic therapy selection is regulated by efficacy, organism susceptibility, and side effect profile.⁴ The optimal duration of antibiotic treatment is critical in clinical practice because undertreatment leads to infection persistence, which increases the risk of amputation and systemic sepsis, whereas overtreatment increases the risk of multi-drug-resistant organisms and antibiotic-associated infections.⁵⁻⁷

Antibiotic therapy should last 1-2 weeks for most mild and moderate infections, and 1-4 weeks for severe infections. For severe infections and some moderate infections, parenteral medication should be used first, followed by oral therapy when the infection responds.⁸

This research article aims to investigate the prescription patterns of antibiotics and oral hypoglycemic drugs among patients with DFU. By analyzing the data, we seek to identify the most commonly prescribed antibiotics and oral hypoglycemic drugs, evaluate the adherence to

established guidelines, and explore any associations between prescription patterns and patient outcomes

2.1 Methodology: This prospective observational study was conducted in tertiary care hospital in Chennai. A total of 48 patients were recruited in the study, following a six-month (May 2022 – October 2022) The study data was collected during the ward rounds using a patient profile form, which includes Patient demographics, history of present illness, past medical history, past medication history, investigation, current therapy of antibiotics and oral hypoglycemic drugs.

2.2 Statistical Analysis: After completing the data collection all the study parameters will be recorded on the spreadsheet, and categorical variables will be analyzed using the chi-square test in SPSS version 26 for Windows. P value <0.05 was considered statistically significant.

2.3 Inclusion Criteria:

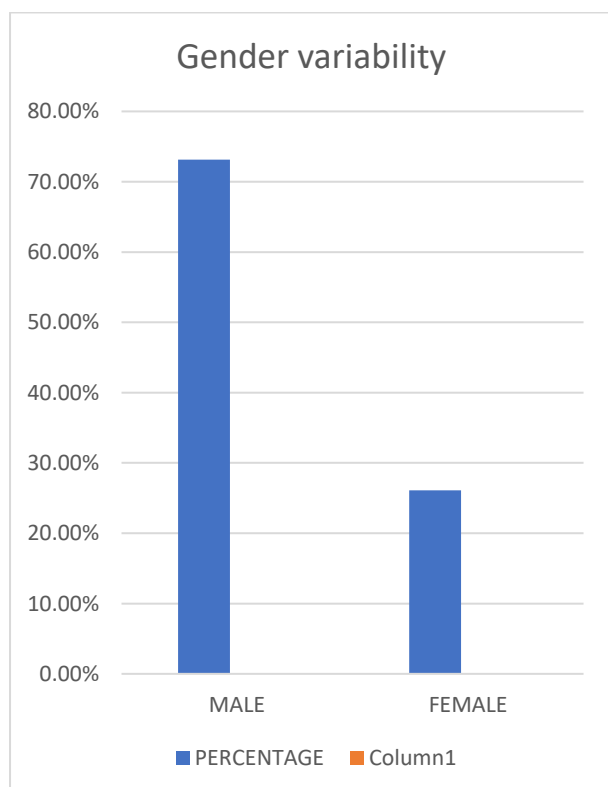
- Participants who give consent for the study
- Participants above 30-80 years of age.
- In-patients with diabetic foot infections are included in the study.
- Both genders
- Patients prescribed antibiotics and oral hypoglycemic drugs.

2.4 Exclusion Criteria:

- Pregnant women
- Psychiatric patients
- Foot infections due to chronic diseases like TB , malignancy , HIV
- Patient has an allergy to antimicrobial agents.

3. RESULTS:

Graph 1. Gender Variability



Graph depicts that male patients are more prone to diabetic foot ulcer 34(73.91%) than females 12(26.09%)

Table 1. Comorbidities Along with Diabetes

S.No	Comorbidities	Frequency	Percentage
1	HTN	12	26%
2	COPD	2	4.5%
3	CAD	2	4.5%

Table depicts that 12 (26%) with hypertension, 2 (4.5%) with COPD, and 2(4.5%) with coronary artery disease

Table 2. Antibiotics Prescribed

S.No	Antibiotics Prescribed	Frequency	Percentage
1	T. Linezolid	2	4.35%
2	Inj. cefotaxime	24	52.17%
3	T. cefixime	1	2.17%
4	Inj. ceftriaxone	5	10.87%
5	T. cefpodoxime	4	8.70%
6	Inj. Cefaperzone/salbutam	3	6.52%
7	Inj. amikacin	1	2.17%
8	Inj. gentamycin	2	4.35%
9	Inj. amoxiclav	2	4.35%
10	Inj. ciprofloxacin	4	8.70%
11	Inj. Trimethoprim-sulfamethoxazole	3	6.52%
12	Inj. Piptaz	3	6.52%
13	Inj. Metronidazole	20	43.47%
14	T. Metronidazole	13	28.26%

Table 2 shows that cefotaxime 24(52.17%) is most commonly prescribed antibiotics and followed by metronidazole 20(43.17%)

Table 3. Insulin Prescribed

S.No	Insulin Prescribed	Frequency	Percentage
1	Inj. Degludec	11	23.91%
2	Inj. Humalin R	12	26.55%
3	Inj. Aspart	6	13.05%
4	Inj. Glargine	4	8.70%
5	Inj. Lispro	3	6.52%

Table 3 shows that Inj.humalin R 12(26.55%) and Degludec 11(23.91%) are prescribed most

Table 4. Oral Hypoglycemic Agents

S.N O	OHA PRESCRI BED	FREQUEN CY	PERCENT AGE
1	T. Acarbose	2	4.35%
2	T. Metformin	31	67.39%
3	T. Glibenclam ide	6	13.04%

Table 4 shows that metformin is the most prescribes OHA drug 31(67.39%), T. Glibenclamide 6(13.04%), and T. Acarbose 2(4.35%)

Overall Frequency and Percentage:

No. of Patients taking Insulin in frequency & percentage - 9 (19.57%)

No. of Patients taking OHA in frequency & Percentage – 19 (41.30%)

No. of patients taking both Insulin and OHA in frequency & percentage – 15 (32.60%)

No. of patients taking neither Insulin nor OHA in frequency & percentage – 3 (6.52%)

4. Discussion: This prospective observational study was conducted to identify the prevalence and prescription pattern of Diabetic foot ulcer in hospitalized patients. Hyperglycemia is a common metabolic disorder characteristic of diabetes mellitus. Nearly all of the body's systems are impacted by diabetes because of its prolonged and multiple complications.⁵ Of people living with diabetes, 20% are at high risk of foot ulceration as a result of neuropathy.⁶ Diabetic foot ulcers are an injury to all layers of skin, necrosis, or gangrene that usually occur on the soles of the feet, as a result of peripheral neuropathy or peripheral arterial disease in diabetes mellitus (DM) patients. The aim of the study is to monitor the prescription pattern of antibiotics and oral hypoglycemic drugs among patients hospitalized with diabetic foot ulcers.

Athira Pillai et.,al has concluded that The study reveals the prevalence of diabetic foot ulcer in diabetic patients. The effective definitive therapy of antimicrobials and antidiabetic treatment and education of the patients on the adequate care of their lesions were essential in increasing the welfare of patients.

Rajalakshmi Ramesh et.,al in a study concluded that targeting the range of glycaemic levels and proper antibiotics is the best way of treating DFU. This study has provided the baseline data regarding the management of DFU which helps to improve therapeutic outcomes.⁵

The sample size estimated was 50, and the study has included only 46 patients due to time constriction and other possible explanations. The study found that 73.91% of participants are male and 26.09% are female. The average age is 60.52. 26% of the participants had HTN, 4.35% of the participants had COPD and 4.35% had CAD. 19.57% of the study participants were taking Insulin. 41.30% of the participants were taking OHA. 32.60% of the participants were taking both Insulin and OHA. 6.52% of the participants were not taking any insulin or OHA. Hence the percentage of patients taking OHA is high when comparing with insulin alone and both insulin and OHA. Analyzing the distribution of antibiotics revealed that Inj. Cefotaxime is prescribed more (52.17%) followed by Metronidazole (43.47%). Inj. Amikacin is the least prescribed antibiotic (2.17%) followed by Inj. Gentamycin(4.35%). Most of the tablet-form antibiotics are prescribed for a few participants. Analyzing the distribution of Insulin revealed that Inj. Degludec is prescribed more (17.39%) when comparing with other commonly used insulin. Inj. Actapid, Inj. Novomix, Inj. Glargine are the preferred insulin

(8.70%) next to Inj. Degludec. To talk about OHA Tab. Metformin (67.39%) is the most prescribed OHA followed by Tab. Glibenclamide (13.04%). Conservative treatment consists of control of diabetes with human actrapid / human mixtard/Lente/Glargine insulin along with appropriate oral or iv antimicrobials along with

simple dressing was effective in the majority of subjects.

This study has several limitations. Firstly, the patient data were gathered from the database of a single tertiary care hospital in Chennai, which cannot represent patients nationwide, and the results may not be generalizable. Secondly, the study population taken is lower in numbers we were unable to continue monitoring the patient after discharge in order to look for wound healing

5. Conclusion: Our study found that the majority of the study participants were prescribed Inj. Cefotaxime and Inj. Metronidazole. Cefotaxime is prescribed to cover gram-negative and gram-positive bacteria. Metronidazole is prescribed to cover anaerobes and *Clostridium difficile*. Comparing with other short and intermediate-acting insulin Inj. Degludec which is long-acting insulin prescribed for most of the participants to provide prolonged glycemic control. Since most of the participants were admitted for diabetic foot ulcer management rather than glycemic control explains the use of long-acting insulin for the participants. Tab. Metformin is prescribed for most patients because the risk of hypoglycemia episodes is very less when compared to other drugs. Targeting a range of glycaemic levels and proper antibiotics is the best way of treating DFU.

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