



Drug Utilisation Pattern for Diabetic Foot

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Abstract

Introduction: Diabetic mellitus is a chronic disorder which is rapidly raising, major public health problem. Having DM are more prone to multifarious complication like diabetic foot ulcer, which is highly susceptible to infection. Prevalence of bacterial flora in foot ulcer of this study population indicate current medical scenario of increased multidrug resistant diabetic foot infection, appropriate selection of antibiotic plays important role in DFU management increasing prevalence of antibiotic resistance is a major factor for morbidity or mortality in DFU.

The main objective of this study was to assess microbial sensitive resistance to antibiotic and also to know the drug utilisation of antibiotics in DFU.

Method: A prospective observational study was carried out in 123 inpatients, after taking written informed consent from those met the study criteria. The study was done from October 2017 to march 2018 in surgery department. Patient case sheet were reviewed and assessed on daily basis. Culture report form and all other relevant data were collected to assess the utilisation of antibiotic, its sensitivity and resistant interaction, drug interactions and ADR were assessed by using Micromedex and other resources available in the department

Result: In this study population, about 87(70.3%) patients were male and 36(29.27%) female. Mainly patients of age range 41-50 is 47(38.21%) followed by 51-60 is 33(26.83%) then 61-70 is 23(18.70%). Hospital

Conclusion: Diabetic foot infections are real public health problem and early diagnosis along with appropriate treatments are essential. Different bacterial profiles and antibiotic sensitivity were found in different DFU. Clinician should try to stay updated in antibiotic sensitivity and resistant pattern of common pathogen in their area for better therapeutic outcome and to minimize medication errors.

Keywords: Diabetic foot ulcer, sensitivity, resistant, utilization of antibiotics, therapeutic outcome.

Introduction

Diabetes mellitus (DM) is one of the most prevalent pathology of endocrine that leads to a number of complications. According to the International Diabetes Federation (IDF) 2017, estimation of, epidemic proportion shows 425 million people in the world has diabetes and is

gradually increase to 629 million in the year 2045 (Younis 2018). The major causes of DM involves impaired insulin secretion or inadequate sensitivity to secreted insulin.¹ DM is provoked mainly by metabolic complications, Such as due to improper storage

and mobilization of metabolic fuels, including the catabolism (breakdown) and anabolism (buildup) of carbohydrates, lipids and proteins arise from defective insulin secretion, its action, or both that can gradually lead to immature death.²

The global prevalence of Diabetic foot ulcer (DFU) was 6.3% and it was more common in people with type 2 diabetes (younis2018). Frequently occurring complication normally affect lower extremities among which DFU is the recognised one.³ It remains prevalent and faces many challenges to treat and may results to hospital admissions and even amputations. It contributes the economic drain on the health care system which may tends to morbidity and even s

The prevalence of causative organisms in DFI may vary from area to area. The organisms that occur on foot infections are mainly *Staphylococcus aureus* and *Streptococcus pyrogens* obtained from the patients' own skin and *Enterococci* from bowel. Among the Gram positive aerobes *Staphylococci* are more universal. Empirical antibiotic therapy should be optimized for local clinical microbiology, Many of these microorganisms are developing resistance to regularly used antibiotics largely due to their indiscriminate use.^{5,6} The standard guidelines encircle with a combination of diabetes education, daily self foot checks, custom padded insoles, specialized diabetic shoes and routine physician follow-ups for foot inspections.⁷

In this present study we used to found out the most commonly found causative organism, prescription pattern of drugs used in diabetic foot along with its bacterial resistance and sensitivity.

Methodology

Materials Medical records of patients with diabetic foot ulcers, who were admitted at the Sri Adichunchanagiri Hospital And Research Center (AHRC) between October 2017 to March 2018, were reviewed. At the first visit a complete medical history was obtained. For analysis of the demographic and clinical characteristics, variables such as age, gender, smoking history, family history, HbA1C, wound duration, diabetes medications used, previous infection history and previous use of antibiotics were investigated, only the first admission period was included in this study. This study protocol was approved by the Institutional Review Board, AH&RC, B G. Nagara.

(AHRC No: AIMS/IEC/1637/2017-18) Culture specimens were collected using sterile cotton swabs. Swabbing was done on inflammed tissue as bacteria tend to present in greater number in these areas After rinsing the wound area with saline and debriding the wound, swab/ tissue samples were collected and taken to the microbiology laboratory.

The study data was analysed by using suitable descriptive statistics like mean, frequency, percentage etc, through Microsoft excels

Result

Table 1: Distribution lof Patients According to Age:

Age	No of persons	% Total
31-40	9	7.32%
41-50	47	38.21%
51-60	33	26.83%
61-70	23	18.70%
>70	11	8.94%

Among the 123 study population majority of the subjects were under the age group of 41-50 years i.e. in 47(38.21%) patients; followed by age group of 51-60 years in 33 (26.83%) patients and age group of 61-70 years in

23(18.70%) patients and 11 patients were under the age group of >70 years and 9 were under the age group of 31-40 years as shown in Figure 1.

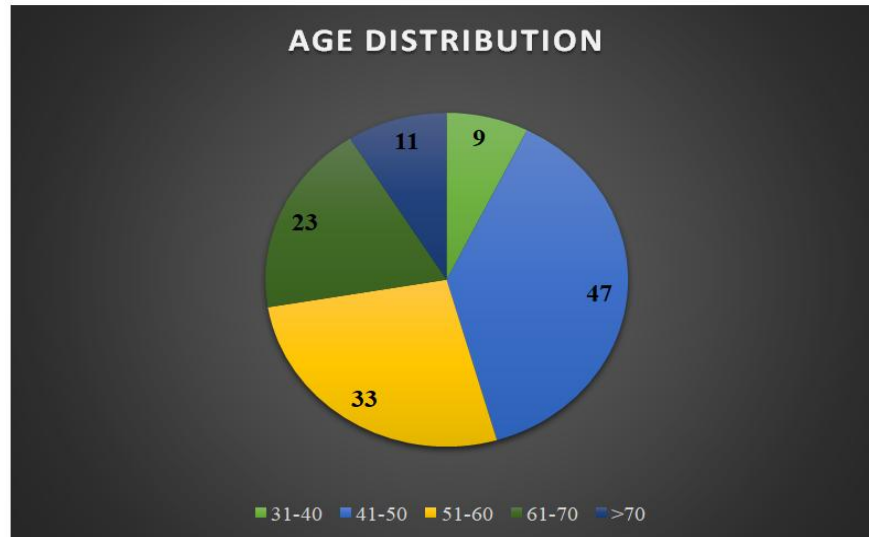


Figure1: Age Distribution

Table 2: Gender Distribution

Gender	No of persons	% Total
Male	87	70.73%
Female	36	29.27%

Among 123 study population, 87(70.73%) patients were males and 36(29.27%) patients were females as shown in Figure 2.

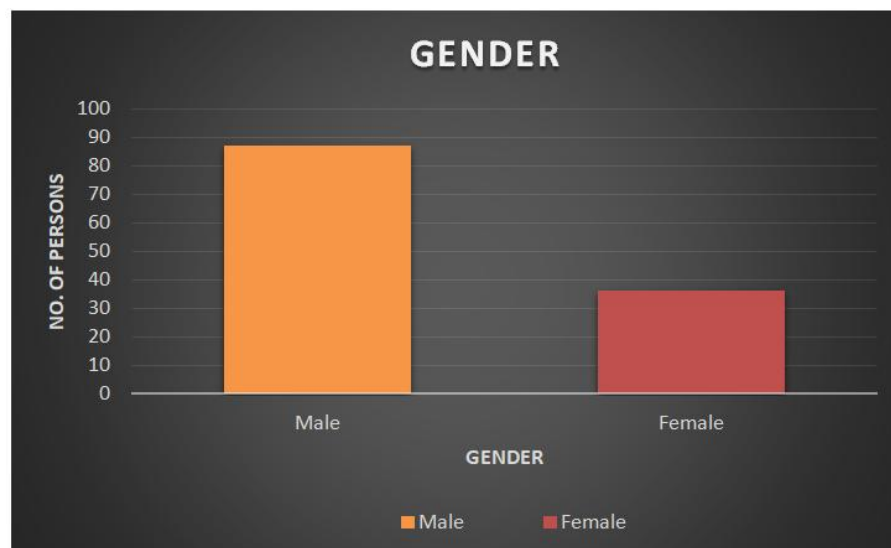
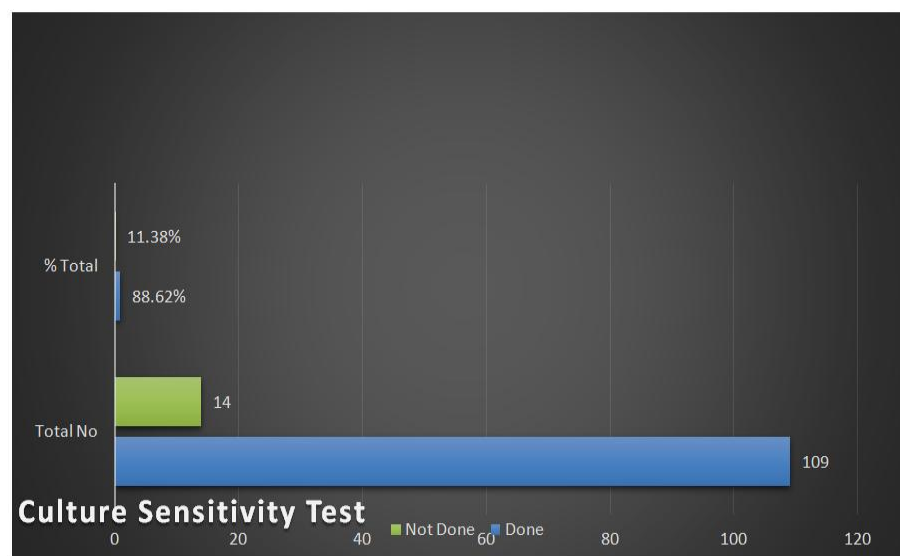


Figure 2: Gender Distribution

Table 3: Culture Sensitivity Test

Culture Sensitivity	No of persons	% Total
Done	109	88.62%
Not Done	14	11.38%

Out of 123 patients, 109 (88.62%) persons had done culture sensitivity test and 14(11.38%) had not done the culture sensitivity test as shown in table 9.

**Figure 3: Culture Sensitivity Test****Table 4: Commonly Found Causative Organisms**

CAUSATIVE ORGANISM	TOTAL NO	% TOTAL
No organism	44	35.77%
Klebsiella species	14	11.38%
Citrobacter koseri	2	1.63%
Enterococcus species	2	1.63%
E coli	6	4.88%
MRS	26	21.14%
Non fermenting Gram -ve bacilli	6	4.88%
citrobacter species	3	2.44%
Providencia species	5	4.07%
Pseudomonas aueruginosa	7	5.69%
Coagulase -ve staphylococcus	3	2.44%
Straptococcus aureus	5	4.07%

Among 123 persons, 44 persons had been found without any causative organisms, 26 persons had found with MRS, 14 persons had been found with Klebsiella species, 7 persons had been found with Pseudomonas aeruginosa, 6 persons had been found with E coli and 6 persons had been found with Non fermenting, 5 persons had been found with

Providencia species, 5 persons had been found with Streptococcus aureus, 3 persons had been found with Citrobacter species, 3 persons had been found with Coagulase –ve staphylococcus, 2 persons had been Citrobacter koseri and 2 persons had been found with Enterococcus species as shown in table 10.

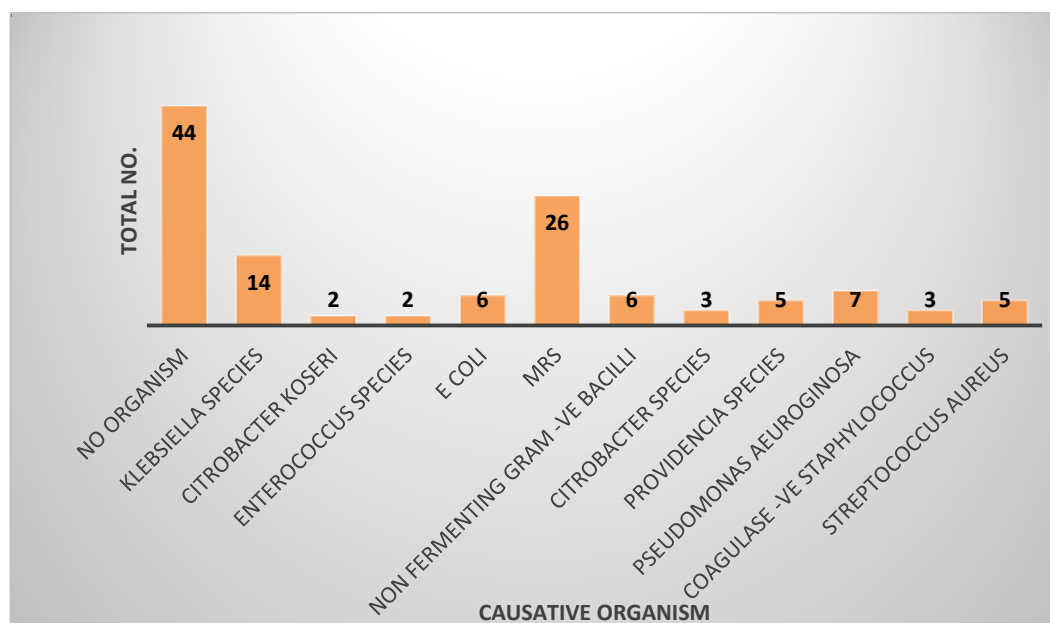


Figure 4: Commonly Found Causative Organisms

Table 5: Commonly Used Antibiotics

Antibiotics	No of patients	% Total
Meropenem	12	6.06%
Linezolid	8	4.04%
Levofloxacin	6	3.03%
Cefaperazone sodium+ Tazobactum	6	3.03%
Cefaperazone sodium+ Sulbactum	6	3.03%
Ceftriaxone	52	26.26%
Metronidazole	27	13.64%
Feropenem	3	1.52%
Amikacin	19	9.60%
Amoxicillin +Augmentin	15	7.58%
Tinidazole	2	1.01%
Piperacillin+Tazobactum	4	2.02%
Cefaperazone	11	5.56%
Cefixime	17	8.59%
Glanocof X	4	2.02%
Gentamycin	6	3.03%

Out of 123 prescriptions, 52 persons were taking Ceftriaxone, 27 persons were taking Metronidazole, 19 were taking Amikacin, 17 were taking Cefixime, 15 were taking Amoxicillin+ Clavulanic acid and 12 were taking Meropenem, 11 were taking Cefaperazone sodium, 8 were taking Linezolid,

6 were taking Cefaperazone sodium and tazobactam, 6 were taking Cefaperazone sodium and sulbactam, 6 were taking Gentamycin, 6 were taking Levofloxacin, 4 were taking Glanocet X, 4 were taking Piperacillin and tazobactam, 3 were taking Feropenem and 2 were taking Tinidazole as shown in figure 3.

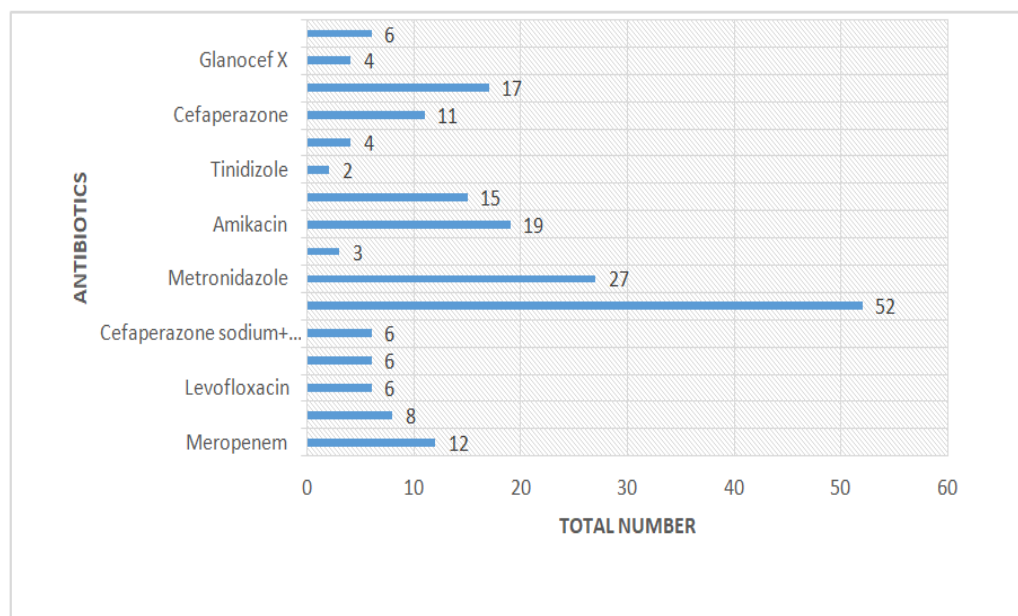


Figure 5: Commonly Used Antibiotics

Table 6: Drug Utilization Pattern

Category	No.of drugs	Percentage
Antibiotics	198	49.13%
Analgesics	127	31.51%
Vitamin supplements	53	13.15%
Others	25	6.20%

Discussion

Among 123 patients enrolled in the study, age group of 41-50(31.21%) years patient were found to be more followed by 51-60(26.83%) year, 61-70(18.70%) year, above 70(8.94%) year and were found in 31-40(7.32%) year. Male patient were higher affected 87(70.73%) while female 36(29.27%). The study was found to be similar to that conducted by **Elhami E, Nagaraju K.**, as DFU was found to be higher in age group of 40-50 years, 59.33% males were affected where as 40.66% of female. Another

study concluded by **Venkatramana Manda et al.**, also shares similar result in which 75% were male and the rest 25% female. 50-59 year (42.5%) were more prone and least affected to age group of 20-29 years. One more study by **Mithun N Oswal** also gives matching result as mainly affected to age group of 41-50 years.

Of 123 subject enrolled in the study, majority of the patient's duration of hospital stay was found to more than 10 days (97.56%) which have similar result with **Perins.M.C et al.**, it shows duration of more than 10 days

Out of 123 patients involved in the study 109(86.62%) patients had done culture sensitivity test and 14(11.38%) had not. And from culture test about 44 test given no organisms and among rest result, most commonly found organism was found to be MRSA(methicillin resistant staphylococcus aureus) which shows similar results with **son t s et al.,** study. This study shows most commonly found organisms as MRSA (methicillin resistant staphylococcus aureus)(13.7%). Study concluded by **Hena.v et al.,** also found as the most frequent occurring causative organism as Staphylococcus.aureus which was as similar in study by **Khare J et al.,**

Among 123 patients in our study commonly prescribed drugs category were found to be antibiotics 198(79.13%), analgesics 127(37.51%), vitamin supplements 53(13.15%) and others 25(6.20%) which as similar result with study conducted by **Peter N, Nissyy Cherian.,** as antibiotics 211(34.9%), analgesics 76(12.6%), anti ulcerent 86(14.2%), anti pyretic 26(4.3%), vitamine supplements 112(18.55) and others 92(15.2%).

In the present study the most commonly used antibiotics was found to be ceftriaxone 52(26.26%) followed by metronidazole 27 (13.64%) and then amikacin 19 (9.60%) which shows similar resulted by the study concluded by **Elhami E, Nagaraju K.**

Among all prescribed drugs, antibiotics were found to be 198(49.13%), analgesics 127(31.51%), vitamin supplements 53(13.15%) and other drugs were about 25(6.20%) as shown in table no 5

Conclusion

This study had provided base line data regarding the prescription pattern (utilisation) of antibiotic drugs in diabetic foot patients. Total 65 culture were isolated. Among these, gram positive methicillin resistant staphylococcus 28 (68.29%) and gram negative klebsiella 12 (50%) spatients were prescribed with three drug combination due to their severity.

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References:

1. Ibrahim A.J.K, Bhatawadekar S.M, Arunima, et.al., Bacterial profile of diabetic foot ulcer: study from western India. International journal of Health sciences and Research.2016; 6(5):65-71.
2. Garg R, Datta P, Gupta V, et.al., Anaerobic bacteriological profile of infected diabetic foot ulcers with their Antimicrobial susceptibility pattern: Need of the Hour. National Journal of Laboratory Medicine.2017; 6(3):1-4.
3. Edan A, Kareem A, Mary A., Bacterial wound Infections in diabetic patients and their therapeutic Implications. Medical practice and Review.2010; 1(2):12-15.
4. Ali O, Ali H.A, Southy H.E, et.al., Microbiological profile of Diabetic foot ulcer and use of IL6 as a predictor for Diabetic foot infection. International Journal of current Microbiology and Applied sciences.2016; 5(12):1-10.
5. Dwedar R, Ismail D.K, Abdalbaky A., Diabetic foot infection: Microbiological causes with special reference to their Antibiotic Resistance pattern. Egyptian Journal of Medical Microbiology.2015; 24(3):95-102.
6. Perim M.C, Borges J.D.C, Celeste S.R.C, et.al., Aerobic bacterial profile and Antibiotic Resistance in patients with diabetic foot infections. Revista da Sociedade Brasileira de Medicinal Tropical.2015; 48(5):546-54.
7. Tamalli M, Gamal M.A.B, Alghazal M.A., Common Aerobic bacterial Isolates from Diabetic foot ulcer and their Antibiotic susceptibility Testing. World

- Journal of Pharmacy and Pharmaceutical sciences.2015; 4(8):260-66.
8. Birra V, Hanumanthu A.K, Budati S, et.al., Aerobic bacterial profile and antibiotic resistance in patients with diabetic and non-diabetic wound infections. *Journal of Evolution Med.Dent.Sci.*2016; 5(98):7180-84.
 9. Khare J, Srivatsava P, Khare J, et.al., Microbiological profile of Diabetic foot ulcers-Experience from a Tertiary care centre in South Asia. *International Journal of General Medicine and Surgery.*2017; 1(2):1-7.
 10. Kunjappan S.P, Saju I.M., Aerobic bacterial profile of Diabetic ulcer in a Tertiary care centre. *Journal of evolution Med.Dent.Sci.*2017; 6(68):4859-62.
 11. Sugandhi P, Prasanth D.A., Bacteriological profile of diabetic foot infections. *International Journal of Innovative Research in science, engineering and technology.*2014, 3(7): 14688-692.
 12. Son S.T, Han S.K, Lee T.Y, et.al., The Microbiology of foot infections in Korea. *Journal of wound management and Research.*2017; 13(1):8-12.
 13. Jithendranath A, Hegadi S, Bhai G, et.al., Bacteriological profile of Diabetic foot in a tertiary care centre in Trivandrum, India. *Journal of current Microbiology and Applied Sciences.*2016; 5(6):279-86.
 14. Bengalorkar G.M, Kumar T.N., Culture and sensitivity pattern of micro-organism isolated from diabetic foot infections in a tertiary care hospital. *International Journal of Biomedical and Pharmaceutical Research.*2011; 1(2):34-40.
 15. JJ Mendes et al., clinical and bacteriological survey of diabetic foot infection in Lisbon; *Diabetic research and clinical practice.* 2012; 95(1): 153-161