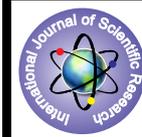# Antibiotic Sensitivity Pattern of Pseudomonas Isolated From Diabetic Foot Ulcers From Surgery Department in a Tertiary care Hospital in Ahmedabad, Gujarat

Dr. Manisha Jain	Tutor, Department of Microbiology, GMERS Medical College, Sola, Ahmedabad.
Dr. Sachin Patel	Assistant professor, Department of Microbiology, GMERS Medical College, Sola, Ahmedabad
Dr. Nidhi Sood	Professor & Head, Department of Microbiology, GMERS Medical College, Sola, Ahmedabad.

ABSTRACT

Introduction: A Prospective study "Antibiotic sensitivity pattern of Pseudomonas isolated from diabetic foot ulcers" was carried out in surgery department of a tertiary care hospital, Ahmedabad on 125 patients. Material and Methods: Swabs samples were collected from the margins of ulcers and organisms were identified by culture, pigment production, gram staining and biochemical reactions anddid antibiotic sensitivity pattern. Results: Out of 125 specimens 108 specimens showed growth of organisms. Total 157 aerobic organisms were isolated from culture positive specimens. . Among these organisms, 130 gram negative and 27 gram positive organisms were isolated. Pseudomonas aeruginosa (30.57%) was predominant organism. Conclusion: Diabetic foot infections are polymicrobial in nature. Pseudomonas aeruginosa (30.57%) was predominant organism. Pseudomonas aeruginosa is highly resistant to many antibacterial agents and consequently is an important potential contaminant of pharmaceutical preparation.

INTRODUCTION:-

Diabetes mellitus comprises a group of common metabolic disorders that share the phenotype of hyperglycaemia. The prevalence of diabetes depends on many aetiological factors such as age, sex, heredity, diet, socio-economic conditions and physical activity, environmental factors, life style choices etc. Thus, diabetes is multi factorial disease in which various factors act in complex manner.

Pseudomonas aeruginosa has become an important cause of infection, especially in patient with compromised host defence mechanisms. It is most common pathogen isolated from hospitalized patients and cause nosocomial infections and can be life threatening.

In this study assess risk factors & comparative in vitro antibiotic susceptibility patterns of pseudomonas isolated from diabetic foot ulcers and study the incidence of emergence of multidrug-resistance. As not enough data and studies are available in Gujarat, this study will give a reference for further studies and will behave as a baseline incidence.

MATERIAL & METHODS:-

Sample:

The study was based on 125 swab specimens received from diabetic patients with foot ulcers attending tertiary care hospital since February 2009 to April 2010. Specimens included in the study were from "Soft tissue infection" which includes foot wound. Specimens were obtained using aseptic techniques to avoid contamination and were promptly transported to the laboratory in sterile swab.

Isolation and Identification of Pseudomonas aeruginosa

The isolation and identification of test organisms was carried out by Gram staining, motility, catalase, oxidase, and pigment production, ability to grow at 42°C, arginine dihydrolase .

Antibiotic Sensitivity Testing (Kirby Bauer-Disk Diffusion Method)

Antibiogram was performed using commercially available antibiotic discs with a standard Pseudomonas aeruginosa ATCC 27853 as a positive control. Kirby-Bauer, recommended by the CLSI4 was used for antimicrobial susceptibility testing. The identified 48 Pseudomonas aeruginosa strains were tested against Meropenem, Piperacilin, Piperacilin/Tazobactam, Cefotaxime, Ceftazidime, Cefoperazone, Cefpirome, Cefepime – Tazobactam, Amikacin, Gentamicin, Kanamycin, Netilmycin, Aztreonam, Ciprofloxacin, Ofloxacin, Levofloxacin.

RESULTS:

Table 1 shows the pattern of isolation of microbial growth from Diabetic Foot Ulcer. 125 patients with the clinical diagnosis of Diabetic Foot ulcer were enrolled for this study. Out of 125 specimens, 108 (86.4%) specimens showed bacterial growth in which 157 organisms were isolated while 17 (13.65%) specimens did not show any growth. It represents an average of 1.25 organisms per case.

Table 1: Isolation of organisms (n=157)

Total Patients examined	125
Total No of patients with microbial growth n (%)	108 (86.4%)
No growth n (%)	17 (13.65%)
Gram Negative Isolates	80.2%
Gram Positive Isolates	17.8%

Most of the Pseudomonas aeruginosa were susceptible to piperacillin-tazobactam, Cefepime – Tazobactam, and Meropenem while they were showing varying susceptibility to gentamicin, amikacin, Cefotaxime, Ceftazidime, Cefoperazone, Piperacilin and netilmicin and being less susceptible to Ciprofloxacin, Levofloxacin, and Kanamycin.

DISCUSSION:

Diabetic foot ulcer is the most common complication requiring hospitalization among diabetic patients. It is also the most common cause of non-traumatic lower extremity amputations.

Physicians have an important role in the prevention, early diagnosis and management of diabetic foot complications. Management however entails an extensive knowledge of the major risk factors for amputation and preventive maintenance. This study allowed us to evaluate the degree of this problem in our institution.

The pre- eminent role of Pseudomonas aeruginosa in hospital infection is due to its resistance to common antibiotics and antiseptics and its ability to establish itself widely in hospitals. Being an extremely adaptable organism it can survive and multiply even with minimum nutrients, if moisture is available.

The study is compared with studies of various researchers in India and across the world. In the present study, total of 157 organisms were isolated from 125 patients and average of 1.25 organisms per patient was found. The observations are close to Ekta et al[8] while differ significantly from Chincholikar[9] as per table 3.

Table no 2 and 3 summarize the comparison of antibiotic sensitivity patterns of Pseudomonas respectively with other studies. The antibiotic sensitivity pattern of Pseudomonas was approximately similar to study by Ekta et al (8) .

Research Paper

Table no.2: Antimicrobial sensitivity of Pseudomonas aeruginosa isolated from diabetic foot ulcers (n = 157)

Anti microbial agent	Proportion susceptible (%)
Meropenem	91.61
Piperacilin	66
Piperacilin/Tazobactam	83.33
Cefotaxime	64.58
Ceftazidime	72.92
Cefoperazone	60
Cefpirome	75
Cefepime – Tazobactam	91.67
Amikacin	68.75
Gentamicin	62.5
Kanamycin	16.67
Netilmycin	79.17
Aztreonam	54.17
Ciprofloxacin	25
Ofloxacin	47
Levofloxacin	16.67

Table no. 3: Comparison of studies on isolates in DFU

Author	Pseudomonas
Chincholikar	19%
Ekta	22%
Present study	30.57%

Table no 4 summarize the similarity in Meropenam sensitivity in Ekta et al (8) and present study while more resistance pattern for other antibiotics like Piperacilin, Ceftazidime, Amikacin and Ciprofloxacin.

Table no. 4: Comparative study of pseudomonas sensitivity pattern to anti microbial drugs

Anti microbial agents	Ekta	Present study
Meropenem	100%	91.61%
Piperacillin	83.33%	77.08%
Ceftazidime	94.44%	72.92%
Amikacin	78.95%	68.75%
Ciprofloxacin	62.50%	75%

SUMMARY

In the present study "Antibiotic sensitivity pattern of Pseudomonas isolated from diabetic foot ulcers" 125 specimens were taken. Out of 125 specimens 108 specimens showed growth of organisms. Total 157 aerobic organisms were isolated from culture positive specimens. Among these organisms, 130 gram negative and 27 gram positive organisms were isolated.

Pseudomonas aeruginosa (30.57%) is predominant organism .High level of resistance to Cephalosporin's, Floroquinolones and drug combinations like Pipercilin + Tazobactam, Cefepime + Tazobactam and Meropenam were most effective against Pseudomonas aeruginosa.

This high level of resistance observed in the present study may be due to the wide spread use of broad spectrum antibiotics leading to survival advantage of resistant pathogens.

This increasing incidence of multidrug resistant organisms is a potential risk factor in management of diabetic foot infections which may lead to devastating complications like systemic toxicity, gangrene formation and amputation of lower extremity. These multidrug resistant organisms are frequently resistant to many classes of antibiotics so it is necessary for the clinician to be completely aware of the prevalence rate of multidrug resistant organisms and their management strategies. So this study will help the clicians to choose appropriate antibiotic or combination of antibiotics for the treatment of Diabetic Foot Ulcer.

Pseudomonas aeruginosa may cause severe tissue damage in diabetics and should never be ignored as insignificant in diabetic foot ulcers. Moreover, it should never be considered contaminants or normal flora and it should clearly be considered a pathogen because it may result in sepsis and amputation

REFERENCE   1. Kasper Dennis L, Fauci Anthony S, Longo Dan L, Braunwald Eugene, Hauserm Stephen L, Jameson J Larry. " Harrison's Principles of internal Medicine", Edition 16th 2005, Volume II, Page No. 2152 – 2179 | 2. Singh Nalin, Armstrong David G, Lipsky Benjamin A. "The Journal of American Medical Association", Edition 2005; 293, page No. 217-228 | 3. Wagner FW "The Diabetic Foot" Edition 1987, Volume 10, Page No. 163-172 | 4. National Committee for clinical laboratory standard: Performance standard for antimicrobial susceptibility testing: Twelfth informational standard. M100-S12, Vol. 22, no. 1,Villanova, PA, National committee for Clinical laboratory standard,2002 | 5. Chang A, Eslao E, Panilagao G, Quimpo J. Diabetic foot ulcers: Experience at the Philippine General Hospital. Phil J Intern Med 1996; 34:205-209. | 6. Lea Renina I, Llanes M. D., Adrian C Pana, Rochella cauton – Valera " Clinical microbiological profile and outcome of diabetic patients with foot ulcers admitted at the Quirino Memorial Medical Centre" Jan 2000 to May 2001 | 7. Benedicto J, Juarez R, Lim S. A descriptive study on the clinical characteristics, management and the outcome of diabetic | 8. Bansal Ekta, Garg Ashish, Bhatia Sanjeev, Attri A K, Chander Jagdish " Spectrum of microbial flora in diabetic foot ulcers" 2008, Vol. 51, issue 2, Page 204 to 208 | 9. Chincholokar DA, Pal R B . study of fungal and bacteriological infections of the diabetic foot. indian J Pathol Microbial 2002, 45 : 15 – 72 | 10. Shanker EM, Mohan V, Premlatha G, Srinivasan RS, Usha AR: Bacterial etiology of diabetic foot infections in South India. Eur J Intern Med 16:567–570, 2005 | 11. Prabahakar P , Rao A B , Hira J. Bacteriological study diabetic foot ulcers. Trop Gogr Med 1981;33; 249 to 252 | 12. Gadepalli Ravisekhar, Kapil Arti, Dhawan Benu, Ammini A. C., Sree nivas Vishnubhatla, Chaudhary Rama " A Clinical microbiological study of Diabetic foot ulcers in an Indian tertiary care hospital" Volume 29, Page no. 1727-1732 |