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Isolation of Bacterial Causative agents for Diabetic Foot patients and Antibiotic Susceptibility test against Bacterial Isolates

Dalya G. Kleef
Medical Laboratory Technology Dept., College of Health and Medical Technology, Southern Technical University,
Basrah, Iraq
dalyaghaze@gmail.com

Khwam R Hussein *
Department of Medical LaboratoryTechniques, Nasiriyah Technical Institute, Southern Technical University,
Nasiriyah 64001, Iraq.
krhussein@stu.edu.iq

Hamid J. Abbas
Al-Zahra'a Medical College, University of Basrah,
Basra, Iraq
hamed@uobasrah.edu.iq

Abdulhussein K. Marzoq
Consultant orthopaedic surgeon, Al-Faiha'a Teaching Hospital, BasrahHealth, Basra, Iraq
abdulhusseinmarzoq62@gmail.com
* **Corresponding author:**email: krhussein@stu.edu.iq

Abstract—Background and objective: diabetic foot infections (DFIs) and Diabetes foot ulcers (DFUs)are linked to lower-extremity amputation, hospitalization, and a high morbidity and mortality rate. DFIs/DFUs have varied bacterial communities that influence illness prognosis. Bacterial diversity is assessed in DFUs/DFIs to determine an appropriate therapy.

Methods: The Al-Faiha Specialized Diabetes, Endocrine and Metabolism Center conducted this cross-sectional research from September 15, 2021, to March 22, 2022. The study included 46 patients (26 male and 20 female) suffering from diabetic foot. Bacterial isolates, sensitivity and resistance were diagnosed by Vitek (bioMerieux, French).Results: 21.74% of patients have Gram positive bacteria, 67.39% of patients have Gram negative bacteria, whereas 10.87% showed no growth. In the positive culture showed following percent: *Pseudomanasaeroginosa* (33%), *E. coli* (18%), *Klebsiella pneumoniae* (7%), *Enterococcas faecalis* (5%), *Protuse mirabilis* (4%), *Staphlococus homenous* (4%), *Staphlococus ureuse* (4%), *Lactococcus garvieae* (2%), *Pseudomanasputida* (2%), *Serratia plvmuthica* (2%), *Staphlococus epidermidis* (2%), *Streptococcus uberis* (2%) and no growth (15%).Conclusions: *Pseudomonas aeruginosa* was the most common bacterium among the polymicrobial infections seen in the majority of DFI specimens. For initial care of these wounds, combination antimicrobial therapy may be necessary.

***Keywords*—Diabetic Foot, Bacteria, DM, Antibiotic Susceptibility**

I. INTRODUCTION

Diabetic foot is one of the most serious and expensive diabetic complications. Nearly 6% of persons have the illness (Mishra *et al*., 2017)**.** If diabetic foot sores are not treated promptly, they can deepen and reach the bones and tendons, causing infections. Diabetes that is untreated for an extended period of time, as well as diabetic foot infections and muscle and bone weakness, results in foot abnormalities. Excessive pressure on bones can cause them to crack or alter form(Petersen *et al*., 2020).Inadequate blood and oxygen supply, resulting in the creation of black tissue, which is the first indication of gangrene in the foot. Severe infections, abscesses, and gangrene in the foot make healing of the foot ulcer difficult. In such circumstances, amputation of the infected foot is the only way to prevent the infection from spreading to the bloodstream. The infection can spread to the circulation, resulting in sepsis. These problems might have fatal consequences (Petersen *et al*., 2020)**.** In the year of 2030, there are expected to be 600 million people worldwide have diabetes, up from 425 million in 2017. A few to one-third of diabetic people develop diabetic foot ulcers (DFUs) throughout the course of their lifetime, with half of them becoming inflamed and causing diabetic foot infections (DFIs). 15% of DFI patients need to have their lower limbs amputated in order to prevent contamination improvement (Commons *et al*., 2018; Xu & Wang, 2019). If not treated immediately, infectious agents are linked to amputation of the diseased foot. Diabetic foot lesions need more hospitalizations than any other particular consequence of diabetes, and optimal care of these infections necessitates antibiotic selection based on culture and antimicrobial susceptibility data (Lipsky *et al*., 2016).The most frequent diabetic foot problems, foot infections are a major contributor to the growth of wet gangrene. With inadequate blood circulation in the foot, *Pseudomonas spp., Enterococcus spp., and Proteus spp.* play an unique role in the ongoing and severe tissue damage. The study's objective was to examine the microorganisms responsible for diabetic foot infections, their antimicrobial susceptibility profile, and the severity of tissue lesions.

II. MATERIALS AND METHODS

A. *Study design and participants*

The Al-Faiha Specialized Diabetes, Endocrine and Metabolism Center conducted this cross-sectional research from September 15, 2021, to March 22, 2022. This study comprised 46 patients (26 male and 20 female) with diabetes foot who visited the laboratory at Al-Fayhaa Hospital in Basrah for routine testing. None of the participants had ever been to a clinic for diabetic foot. The patients' ages varied from 45 to 70 years.

B. *The biochemical parameters:*

The best aerobic and anaerobic microbiological methods were used to cultivate the specimens. Standard microbiological techniques were used to identify bacterial isolates, and the Clinical and Laboratory Standards Institute's standards were followed when testing for antibiotic susceptibility (CLSI).

Povidone-iodine was used to clean the diabetic foot infection site prior to sampling, and material deep inside the infected areas was aspirated to collect culture specimens. A drop of its contents was first added to the thioglycolate broth medium, and then the syringe was quickly shut. The sample was sent to the lab in less than 20 minutes, and it was typically vaccinated no later than an hour following collection. Vitek determined the sensitivity and resistance of bacterial samples (bioMerieux, French).

C. *Statistical analyses*

In this study just used Microsoft Office Excel 2019 for Windows..

III. RESULTS

In Table 1 shows 19.57% of patients have Gram positive bacteria, 69.57% of patients have Gram negative bacteria whereas 10.87% showed no growth.

TABLE (1): BACTERIAL ISOLATES FROMDIABETIC FOOT INFECTIONS

N (%)	No growth	Gram positive	Gram Negatives	Total
Male (26)	2(4.35)	5(10.87)	19(41.30)	26(56.52)
Female (20)	3(6.52)	4(8.70)	13(28.26)	20(43.48)
Total patient	5(10.87)	9(19.57)	32(69.57)	46(100)

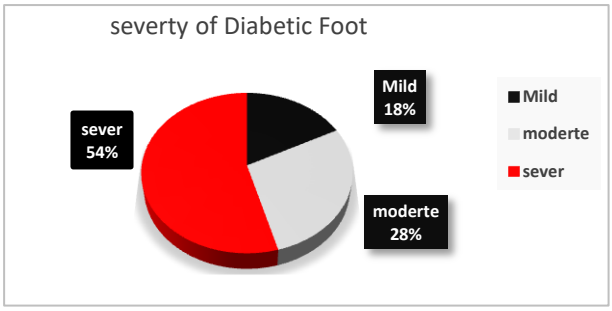

Figure (1): showseverty of Diabetic Foot infections

The results of the current study showed bacteria determined *Pseudomanas aeroginosa*(33%), *E.coli* (18%), , *Klebsila pneumoniae* (7%), *Enterococcas faecalis*(5%), *Protuse mirabilis*(4%), *Staphlococus homenous*(4%), *Staphlococu .ureuse*(4%), *Lactococcus garvieae*(2%), *Pseudomanas putida*(2%), *Serratia lvmuthica*(2%), *Staphlococus epidermidis* (2%), *Streptococcus*spp (2%), *Streptococcus uberis*(2%) and no growth (15%).Also in this study show *pseudomanas aeroginosa* was more resistance to Amoxicillin, Ceftizioxime, Cloxacillin and Levovlaxicime, while it more sensitive to Ampicillin, Chloramphenicol, Gentamycin and Rifampicin. *E.coli is* more resistance to Amoxicillin, Ampicillin, Cephotoxime and Erthromycin while it more sensitive to Amikacin and Meropenem. *Klebsilla pneumoniae* wasmore resistance Amoxicillin and Gentamycin while it more sensitive to Ciprofloxacin and Levovlaxicime.

IV. DISCUSSION

Diabetes mellitus (DM) foot ulcers are widespread and dangerous side effects of DM. In Iraq as well as the rest of the globe, the frequency of foot infections is rising along with that of DM (Marzoq*et al*., 2019; Mohammed *et al.*, 2016; Qadir *et al*., 2020). This prospective investigation was carried out to assess the depth of tissue harm in these individuals with diabetic foot ulcers, the diabetic foot infections, the causal microorganisms, the antimicrobial susceptibility profiles of them, and the diabetic foot infections. According to DFU cultures used in the current investigation, 10.87%, 21.74%, and 67.39% of the Gram positive and Gram negative bacteria showed no signs of growth, respectively (Anandi*et al*., 2004). *Pseudomonas aeruginosa* (33%) and *E. coli* (13%) was the commonest isolate, which agreed to studies (Al Benwan et al., 2012; Anandi et al., 2004; Kurup& Ansari, 2019). Numerous investigations, including those conducted in several Western nations, have shown that *S. aureus* is the most prevalent pathogen (Revele*set al.*, 2016; Shree *et al*., 2013; Wu *et al*., 2018).*P. aeruginosa* was the most prevalent Gram negative bacterium, as shown in earlier investigations (Al Benwan*et al*., 2012; Murali *et al*., 2014; Sekhar *et al*., 2014), It's possible that the lack of anaerobic culture was caused by difficulties handling anaerobic material.

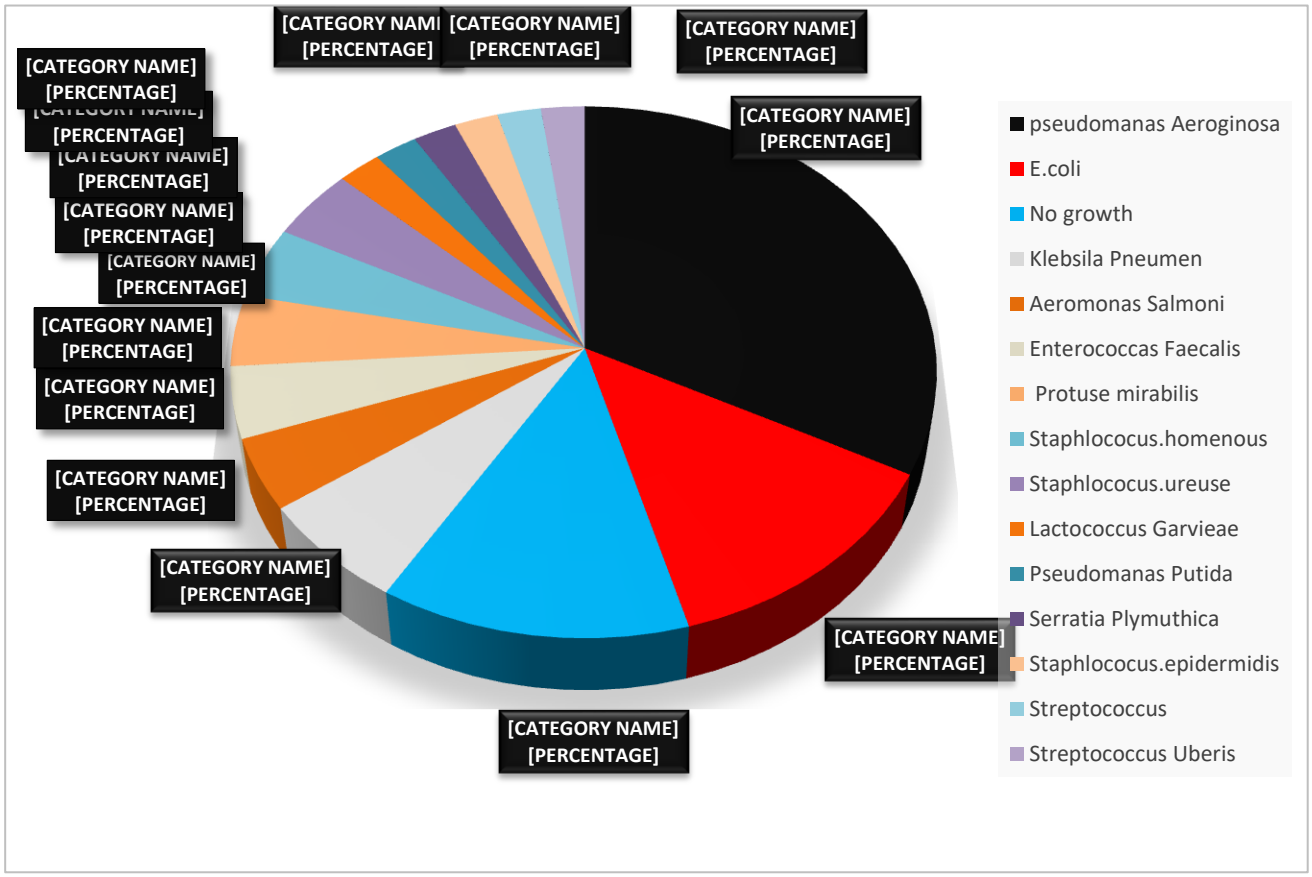

Figure (2) : Show Percentage of bacterial species that appeared in culture

As a result, only the aerobic flora of the findings was examined. Despite the fact that anaerobes are in the minority and that most literature gives aerobes primacy (Al Benwan*et al.*, 2012). This study was in agreement with other studies in that the majority of Gram negative bacteria were resistant to amoxicillin and ampicillin, but amikacin was the most effective antimicrobial agent for these bacteria (Kurup& Ansari, 2019). In developing or low-income nations, healthcare personnel have limited resources and as a result, are unable to treat DFIs according to recommended practices. However, in order to improve the results of DFI, it is crucial to adhere to tight rules including multidisciplinary foot teams.

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V. CONCLUSIONS

In conclusions the majority of DFI specimens displayed polymicrobial infections, with *Pseudomonas aeruginosa* being the most common bacterium. For initial care of these wounds, a particular combination of antibiotic medication may be necessary.

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