

# Prevalence And Microbial Profile Of Diabetes Mellitus-Associated Infections In A Tertiary Care Hospital: A Retrospective Observational Study

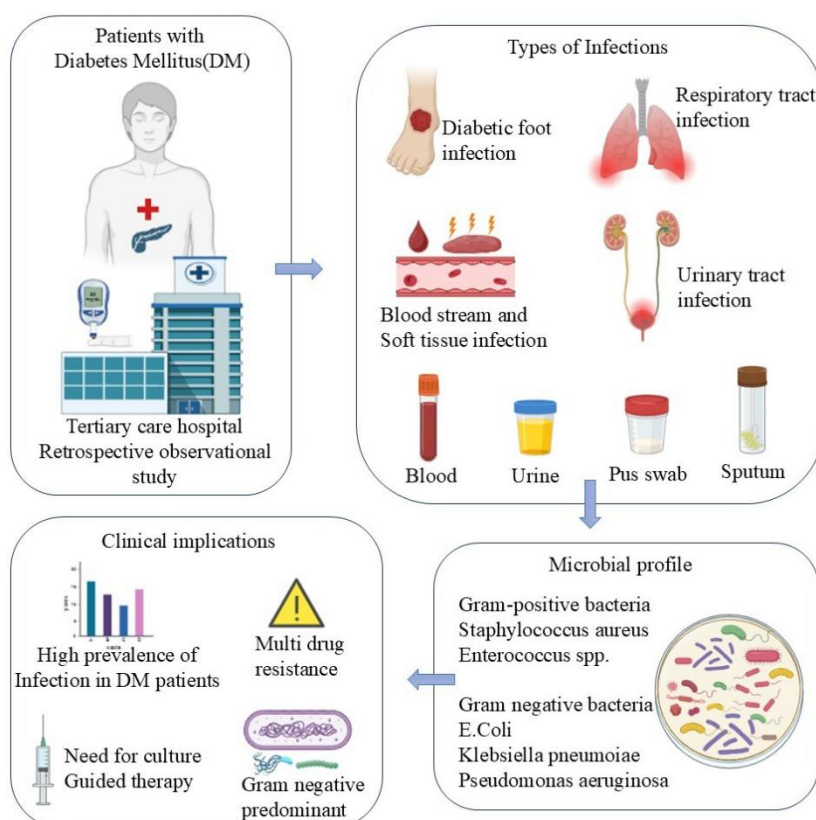
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## Graphical Abstract



## ABSTRACT

### Background

Patients with diabetes have elevated blood sugar levels over time, making them more vulnerable to infections. Urinary tract infections, lung infections, and severe foot infections are typical illnesses associated with hyperglycaemic situations. These infections lead to serious health problems, extended hospital stays, and higher medical costs. Due to these complications, early prevention and treatment are crucial.

### Objective

To determine the common infections associated with diabetes, the bacteria responsible for these infections, and the available treatments in a tertiary care facility

### Methods

A retrospective observational study was conducted at IQRRA International Hospital and Research Centre, Kozhikode, from 1st October 2023 to September 2024. Data were collected from medical records and structural data collection forms of 41 diabetic patients suffering from various severe infections. The study analyzed demographic details, infection types, and effective treatments.

### Results

Among the 41 diabetic patients included in the study, a high percentage of males were affected by infections associated with diabetes (61% men vs. 39% women). Most patients were in the age group of 60–70 years (37%). Diabetic foot infection was the most common type, affecting approximately 33% of patients, followed by urinary tract infections and respiratory tract infections (23% each).

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*Staphylococcus aureus* was the predominant bacterium causing diabetic foot infections (69%). Urinary tract infections and respiratory tract infections were primarily caused by *Escherichia coli* (56%), *Streptococcus pneumoniae*, followed by *Pseudomonas aeruginosa* (33%) and *Staphylococcus aureus*. The high prevalence of *Staphylococcus aureus* and *E. coli* highlights the need for early identification of causative microorganisms and appropriate treatment regimens

**Keywords:** Diabetes associated infections, Prevalence, Diabetic Foot Infections (DFI), Urinary Tract Infections (UTI), Respiratory Tract Infections

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## Introduction

Diabetes mellitus is recognized as a clinically diverse category of metabolic dysfunction characterized by elevated blood glucose levels attributable to dysfunctional  $\beta$ -cells, insulin resistance, or both. Diabetes mellitus (DM) can be conventionally classified into type 1 diabetes mellitus (T1D), encompassing latent autoimmune diabetes in adults (LADA); type II diabetes mellitus (T2D); specific types arising from defined etiologies such as monogenic diabetes syndromes, exocrine pancreatic disorders, or drug- and chemical-induced diabetes; and gestational diabetes mellitus, which is first recognized during pregnancy[1]. As referred in the 10th edition of the International Diabetes Federation (IDF), Diabetes Atlas, diabetes continues to be regarded as one of the fastest-growing global health challenges of this century. In 2021, around 537 million adults were affected by diabetes worldwide. This figure is presumed to increase to 643 million by 2030 and to 783 million by 2045. The report further pointed out that about 541 million adults were estimated to have suboptimal glucose tolerance in 2021. During the same year, diabetes and the related complications were estimated to cause approximately 6.7 million fatalities among adults in the 20 to 79-year age bracket[2]. As diabetes advances, it leads to significant damage to body tissues and blood vessels, resulting in numerous long-term complications affecting both the macrovascular and microvascular systems. Microvascular complications are clinically expressed through conditions including diabetic retinopathy, nephropathy, and neuropathy. In contrast, macrovascular complications involve cardiovascular disease, cerebrovascular disease, and peripheral arterial disease[19,20]. Small blood vessels are damaged in long-term type 1 diabetes, while type 2 diabetes has a higher risk of damage to large blood vessels. Type 2 diabetes is also associated with hypertension, elevated cholesterol levels, and obesity. One of the major complications seen in type 2 diabetes are cardiovascular diseases and renal failure, which can be fatal[3]. The aetiology of diabetes involves increased blood sugar affecting multiple organ systems, where many cells are highly sensitive to high glucose levels. This can cause damage to the vasculature, heart, renal system, nerves, eyes, nerves [4]. Infections are the major health problems in diabetic patients, which is affecting their, daily life, and clinical outcomes. Diabetic patients are more prone to infections because of various factors including

weakened immunity, nerve damage, reduced blood flow, and hyperglycaemia. Infections of the skin, soft tissues, urinary tract, and respiratory tract are commonly seen in patients. Another major reason for hospital stays and amputations in diabetic patients are due to diabetic foot infections, as they damage nerves and reduce blood circulation. The bacteria causing these infections are *Staphylococcus aureus* and *Streptococcus* species. In diabetic patients, their wound healing activity is very slow, which can result in conditions such as cellulitis and abscesses. Fungal infections like candidiasis commonly occurs in the body specially in the moist areas, also worsened by high blood sugar levels. In order to reduce the risk of infections it is important to follow certain preventive measures, including controlling blood sugar, practicing proper foot care, and administering the vaccines[5]. Uncontrolled blood sugar levels can make antibiotics less effective and increase the risk of serious complications such as sepsis[7,8]. It is also very necessary to identify infections at the earliest and treat them rapidly to prevent severe complications and which helps with faster recovery [6]. UTIs are one of the common infections seen in patients with diabetes, along with diabetic foot infections. The most common bacteria causing UTIs is *E. coli*. High blood sugar levels can lead to glucosuria, which creates a favourable environment for bacterial growth. Poorly controlled diabetes weakens the immune system, making white blood cells less effective at fighting infections. Long-term diabetes can also damage blood vessels, reduce blood flow and make it harder for the body to fight UTIs.

Bladder dysfunction is common in diabetic patients and can lead to incomplete emptying of the bladder. The retained urine allows bacteria to multiply. In addition to impaired bladder function, symptoms may include frequent urination, dehydration, burning sensation during urination, foul-smelling urine, abdominal pain, fever, and tiredness [9,10]. Respiratory tract infections (RTIs) are common among people with diabetes, affecting approximately 10–20% of patients. Due to a compromised immune system in individuals with diabetes, viruses, bacteria, and fungi can more easily cause infections. Common respiratory infections include pneumonia, which affects the lungs; bronchial inflammation, which affects the airways; and influenza, which can lead to severe complications. People with diabetes who also have chronic obstructive pulmonary disease (COPD) are at a higher risk, as diabetes can worsen lung function and slow tissue repair. Another

respiratory disease frequently seen in people with diabetes is tuberculosis (TB). These infections can range from mild to severe and may even be fatal. In order to manage these infections, it is necessary to follow the regular vaccination and appropriate medical treatment. It can significantly reduce the risk of respiratory tract infections associated with diabetes [11,12]. Another infection followed by UTI is diabetic foot infections (DFIs). These infections are mainly caused by microbes such as bacteria, fungi, or viruses and causes serious problem which enter the body through cuts or wounds in individuals with diabetes. This leads to severe nerve damage, reduced blood flow, and cuts or injuries. There are three types of DFIs: uncomplicated, complicated, and severe infections. Uncomplicated infections affect only the skin and soft tissues. Complicated infections spread to deeper structures such as bones and tendons. Severe infections cause extensive tissue damage, can spread to other parts of the body, and may become fatal. Certain antifungal medications are used for candidiasis infections this helps in quick relief and helps to identify the infections. In severe cases, surgical treatment may be required. Regulating blood pressure, good foot care, proper wound treatment, and regular foot check-ups and HbA1c levels within the normal range helps to reduce the infections. This study aimed to identify various infections and the treating remedies for the management of diabetes [13]. Several factors—such as age, duration of the disease, demographic characteristics, blood sugar levels, existing health problems, and access to proper treatment—play a major role. Most of the serious infections are seen in geriatric and long-term diabetic individuals. These infections show mild to severe symptoms, and if they are not diagnosed at the early stage, it can worsen the conditions and lead to severe complications associated with diabetes. Another important concern is increasing resistance to antibiotics, which makes the antibiotics treatment difficult. This highlights the use of antibiotic

more carefully and responsibly. Early diagnosis and detection of this infections very much important to prevent death, amputation et

## 1. Research Design and Methods

### Data Source and Study Cohort

Type I and type II diabetes mellitus are analyzed in this retrospective observational analysis. The data collection is done in 1 October 2023 and 1 October 24 at the Department of Diabetology at IQRAA International Hospital and Research Centre, Kozhikode, Kerala. Data were retrieved from hospital medical records, and patients aged 18 years or older were included according to predefined criteria.

This study is approved by The Institutional Ethics Committee of IQRAA International Hospital and Research Centre, Calicut, Kerala. The institution's Ethics Committee approved a waiver of written informed consent for this study.

## 2. Patient Population

### Inclusion criteria

- Age greater than or equal to 18
- Patient diagnosed with type 1 and type 2 Diabetes Mellitus.

### Exclusion criteria

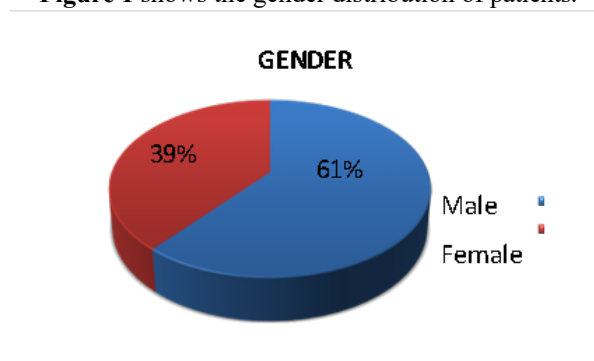
- Patient with insufficient data.

## 3. Results and Discussion

The study was conducted at IQRA International Hospital and Research Centre, Calicut, from 1<sup>st</sup> October 2023 to 30<sup>th</sup> September 2024, involving 74 patients. Due to insufficient data, only 41 cases were systematically selected for the study. Data were extracted through case reports and a data collection form. The gathered information was then systematically tabulated and analyzed.

### 3.1. Gender distribution

Figure 1 shows the gender distribution of patients.



### 3.2. Age-wise distribution

Out of 41 cases, patients were divided into five age-based categories. 10 (25%) of patients belongs to age group 41-50, 8 (20%) patients belong to age group 51-60, 15(37%) patients belong to age group of 61-70, 6(15%) patients belong to age group of 71-80, 2(3%) patients belong to age group of 81-90. Patients aged 61-70 have a high percentage of developing infections (Table 1).



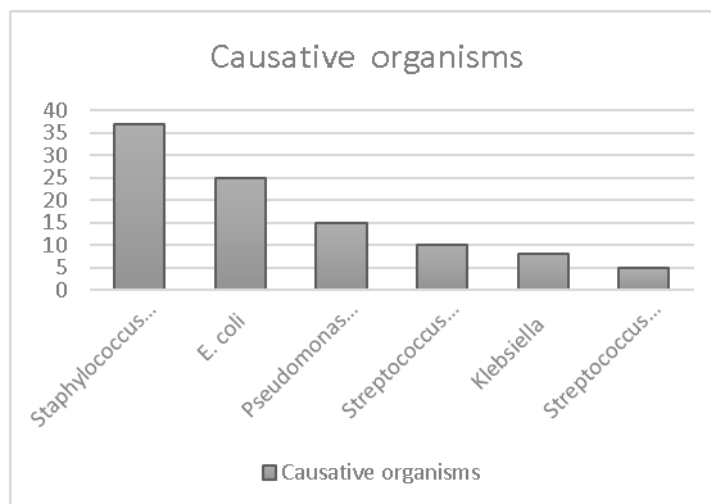


Figure 3 shows the distribution of causative organisms

### 3.6. Distribution of the sample with infection

From the data, Diabetes Mellitus-associated infections are Diabetic foot infection (33%), UTI (23%), Appendicitis (5%), RTI (23%), Otitis (3%), Cellulitis (8%), and Gingivitis (3%). Among these incidences, diabetic foot infection was more common (Figure 4).

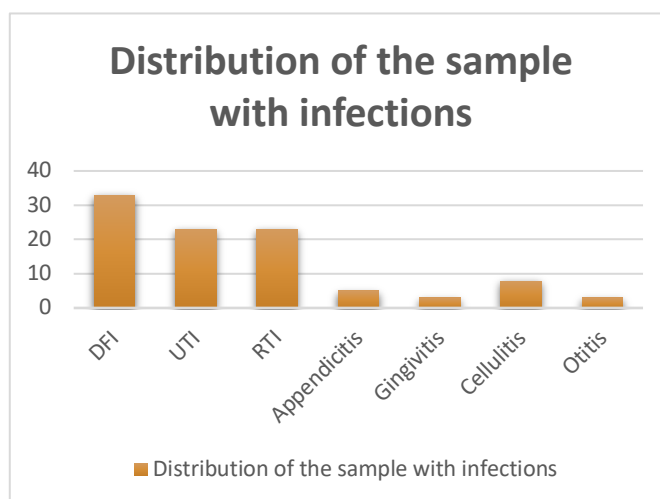


Figure 4 shows the Distribution of the sample with infection

### 3.7. Organisms causing diabetic foot infection

From the data, the pathogens causing diabetic foot infection in the study sample of patients are *Staphylococcus aureus* (69%), *E coli* (23%), and *Klebsiella* (8%). Out of these, most of the cases of DFI occur due to *Staphylococcus aureus* (Table 3).

Table 3 shows the distribution of organisms causing diabetic foot infection.

ORGANISM	FREQUENCY	PERCENTAGE
<i>Staphylococcus aureus</i>	9	69
<i>E coli</i>	3	23
<i>Klebsiella</i>	1	8

Table 3 shows the distribution of organisms causing diabetic foot infection.

### 3.8. Organisms causing urinary tract infection

From the data, the microorganisms causing urinary tract infection in the study sample of patients are *Staphylococcus aureus* (11%), *E coli* (56%), *Pseudomonas aeruginosa* (11%), and *Klebsiella* (2%). Out of these, most of the cases of UTI occur due to *E coli* (Figure 5).

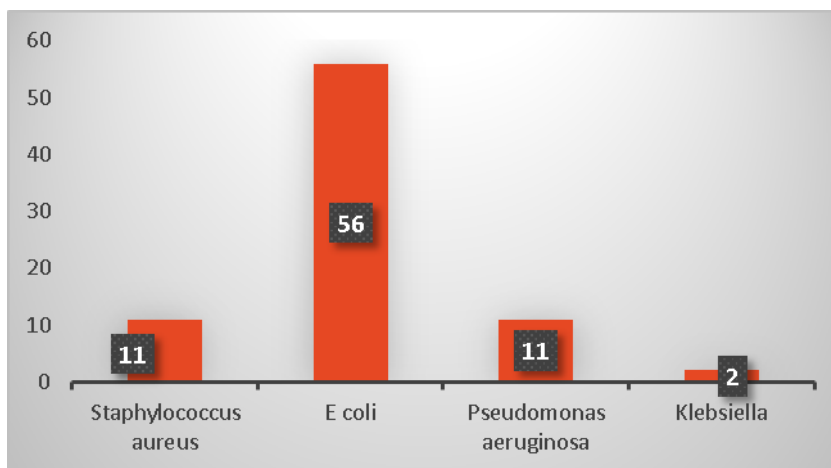


Figure 5 shows the distribution of organisms causing urinary tract infection

### 3.9. Organism causing respiratory tract infection

From the data, the organisms causing respiratory tract infection in the study sample of patients are *Staphylococcus aureus* (22%), *Pseudomonas aeruginosa* (33%), and *Streptococcus pneumonia* (45%). Out of these, most of the cases of RTI occur due to *Streptococcus pneumonia* (Figure 6).

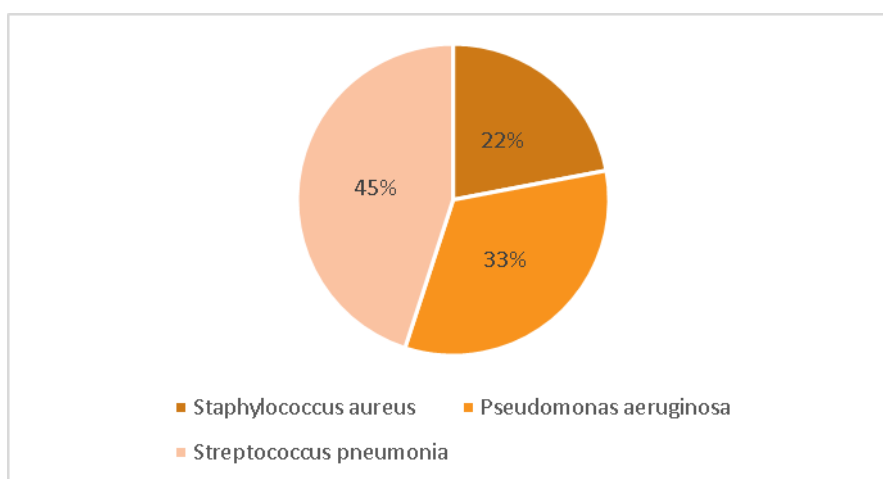


Figure 6 shows the distribution of organisms causing Respiratory Tract Infection

### 3.10. Organisms causing cellulitis

From the data, the organisms causing cellulitis in the study sample of patients are *Staphylococcus aureus*(67%) and *Pseudomonas aeruginosa* (33%). Out of these, most of the cases of cellulitis occur due to *Staphylococcus aureus* (Table 4).

Table 4 shows the distribution of organisms causing cellulitis

ORGANISM	FREQUENCY	PERCENTAGE
<i>Staphylococcus aureus</i>	2	67
<i>Pseudomonas aeruginosa</i>	1	33

### 3.11. Management of diabetic foot infection

From the data, Diabetic foot infections present in the study samples of patients were managed by using various types of antibiotics. The most frequently used is the antibiotic Meropenem, followed by a combination of Piperacillin and Tazobactam (Table 5).

ANTIBIOTICS	FREQUENC Y	PERCENTAG E
PIPERACILLIN + TAZOBACTAM	3	19
CLINDAMYCIN	1	7

MEROPENAM	4	25
LINEZOLIDE	1	6
TRIMETHOPRIME+SULFAMETHOXAZOLE	1	6
CEFTRIAZONE	1	6
SALBACTAM +CEFOPERAZONE	1	6
CEFTRIAZONE	1	6
METRONIDAZOLE	2	13
AMOXICILLIN +CLAVULANIC ACID	1	6

**Table 5 shows the management of diabetic foot infection**

**3.12. Management of urinary tract infection** From the data, Urinary tract infections present in the study samples of patients were managed by using various types of antibiotics. The most commonly used antibiotic is a combination of Trimethoprim and Sulfamethoxazole, followed by Tazobactam and Piperacillin (Table 6).

**4. Table 6 shows the management of urinary tract infection.**

ANTIBIOTICS	FREQUENCY	PERCENTAGE
AMOXICILLIN +CLAVULANIC ACID	1	12
TRIMETHOPRIME +SULFAMETHOXAZOLE	4	50
CEFAPERAZONE +SULABACTAM	1	13
TAZOBACTAM +PIPERACILLIN	2	25

**4.1. Management of respiratory tract infection**

From the data, Respiratory tract infections present in the study samples of patients were managed by using various types of antibiotics. The most commonly used antibiotics are Ceftriaxone and Meropenem (Table 7).

**Table 7: Showing the management of RTI**

ANTIBIOTICS	FREQUENCY	PERCENTAGE
PIPERACILLIN +TAZOBACTAM	1	10
CEFTRIAZONE	3	30
SULBACTAM +CEFOPERAZONE	3	30
AZITHROMYCIN	2	20
MEROPENAM	1	10

**3.14 Management of cellulitis**

According to the data, the antibiotics Clindamycin and Ceftriaxone were used to treat the cellulitis seen in the patient study samples (Table 8).

**Table 8: Showing the management of cellulitis**

ANTIBIOTICS	FREQUENCY	PERCENTAGE
CEFTRIAZONE	2	67
CLINDAMYCIN	1	33

## 5. Discussion

The current retrospective observational study conducted at IQRAA International Hospital and Research Centre, Calicut, was collected and assessed the incidence, microbes affecting and the medical care of diabetes-associated infections. The results from the studies show that infection is a major problem for people with diabetes. These infections can worsen health conditions, increase antibiotic resistance, and create challenges in treatment. [14,15]. In our study, 61% of the patients with infections were male. This finding is consistent with other reported studies, which show that men are more affected by diabetes-related infections such as urinary tract infections (UTIs), respiratory tract infections (RTIs), and diabetic foot infections. The factors effecting the risk of diabetes-associated infections are smoking, lack of exercise, and differences in medical care. [16,17]. Geriatric patients are seen with higher number of, especially those aged 61–70 years. The major severe risk of infections in diabetic individuals includes weakened immune system, long-term blood vessel damage, and reduced ability to fight germs. In our study 49% of the diabetic patients had higher level of blood glucose levels (>250 mg/dL). This result shows similarities with the earlier reported studies. The hyperglycaemic levels reduce the ability of the white blood cells to fight against the infections. This makes the diabetes patients more prone to the infections [19,20]. Many diabetic associated infections also resulted in various other health problems such as cardiovascular diseases, chronic renal disease, and coronary artery disease. Other studies also showed that the same conditions are involved in increasing the risk of infections, which makes the treatment more difficult. In particular, renal failure or diseases are more associated with diabetic infections. The reduced antibiotics make immune system weak and may result in multi organ failure [22]. The infections seen in diabetic individuals are urinary tract infections, respiratory tract infections and diabetic foot infections. The most common type of infection in this study is diabetic foot infections (33%). Similar to other studies it also shows that diabetic foot infections are a main cause of hospital admissions and amputations. These also resulted in nerve damage, reduced blood flow, and delayed wound healing. In our study, the bacteria's resulting in these infections are *Staphylococcus aureus* (69%), followed by *E. coli* and *Klebsiella*. Other authors also reported that *Staphylococcus aureus* is the main pathogenesis for diabetic foot infections worldwide. [13,25,26]. Another major highlight from our study is antibiotic resistance. From our data collected we were able to identify that majority of the diabetic patients are suffering from urinary tract infections, respiratory tract infections etc and these infections showed resistance to the antibiotics when compared to people without diabetes. This means that commonly used antibiotics may not work well unless treatment is based on culture and sensitivity test results. In addition, recent studies on diabetic foot

infections report complex patterns of antibiotic resistance among common bacteria. This shows the importance of proper antibiotic use to reduce drug resistance and improve patient outcomes. [1,6,27,28]. From our study we were able to report that Diabetes associated UTIs is mainly resulted by the bacterium *E. coli* (56%) and RTI is caused primarily *Streptococcus pneumoniae*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*—these pathogens can increase the severity of pneumonia in diabetes [2,15] [29,33]. The Broad-spectrum antibiotics prescribed for the investigation these diabetic infections are like piperacillin-tazobactam and meropenem. This is in line with current clinical practice, which uses these medications to treat complex infections brought on by numerous or resistant bacteria. However, studies indicate that, particularly in cases of diabetic foot infections, selecting antibiotics based on culture and sensitivity test findings can be just as safe and effective as taking broad-spectrum antibiotics. [7]. Overall, these results show that controlling hyperglycaemia, early diagnosis, following treatments mainly antibiotics based on culture results, foot care education and regular vaccinations are important to reduce the risk of infections in people with diabetes. It is also very important to manage antibiotics use carefully and responsibly to prevent the antibiotic resistance. They are very commonly observed with UTI and diabetic foot infections, managing the usage of antibiotics can make the treatment more effective. [31]. In conclusion, this study demonstrates that diabetes-associated infections are strongly affecting the health due to old age, reduced glycemic control, and coexisting comorbidities. Effective management requires a comprehensive approach incorporating individualized antibiotic therapy, prevention strategies, and close monitoring of glycemic status to improve patient outcomes and reduce infection-related complications.

## 6. Summary and conclusion

This study looked back at patient records over 12 months at IQRAA International Hospital and Research Centre, Calicut, to examine how common infections are in people with diabetes, what bacteria cause them, and how they are treated. Information was collected from case records using a structured tool to get a clear picture of infection patterns in hospitalized diabetic patients. Diabetic foot infections were the most common, which matches other studies showing they are a major cause of illness and hospital stays in people with diabetes. Other infections, like ear infections, appendicitis, and gum infections, were less common. Most patients were male, and many had very high blood sugar levels, showing poor diabetes control. High blood pressure was the most common other health problem, followed by kidney disease and heart disease, all of which increase the risk of infections and make treatment more complicated. Bacteria tests showed that *Staphylococcus aureus* was the main cause of diabetic

foot infections and cellulitis, while *Escherichia coli* was most common in urinary tract infections. Respiratory infections were mainly caused by *Streptococcus pneumoniae*. These results match other studies and highlight the importance of knowing which bacteria are common locally to guide treatment. In treatment, broad-spectrum antibiotics were often used: meropenem for diabetic foot infections, trimethoprim–sulfamethoxazole for urinary tract infections, and ceftriaxone or meropenem for respiratory infections. While these antibiotics are sometimes necessary for severe infections, the study emphasizes using culture tests to choose antibiotics and practicing careful antibiotic use to prevent drug resistance. Overall, the study shows that infections are a major problem for people with diabetes, especially those with poor blood sugar control and other health issues. Early detection, good blood sugar management, proper antibiotic use, and preventive care—like regular foot care, patient education, and managing other health problems—are important to reduce infections. As diabetes becomes more common worldwide, preventing and managing infections in diabetic patients with team-based, evidence-based care is essential to improve health and quality of life.

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#### 8. Author Contributions

Idea and manuscript editing: THAMEEMUL ANSARI L H

Manuscript preparation, Study design and conduction: RUBY R, SHAFEENA T

#### 9. References

- Ahlqvist E, Prasad RB, Groop L *et al.* 100 YEARS OF INSULIN: Towards improved precision and a new classification of diabetes mellitus. *Journal of Endocrinology*. 2022 Mar 1;252(3):R59-70.
- Naresh. K Prabakaran. N Kannadasan. R Boominathan. P *et al.* Diabetic Medical Data Classification using Machine Learning Algorithms. *Research J. Pharm. and Tech.* 2018; 11(1): 97-100 doi: 10.5958/0974-360X.2018.00018.5
- International Diabetes Federation. *IDF Diabetes Atlas, 10th ed.* Brussels, Belgium: International Diabetes Federation; 2021.
- Susan van D, Beulens JW, Yvonne T. van der S, Grobbee DE, Nealb B *et al.* The global burden of diabetes and its complications: an emerging pandemic. *European Journal of Cardiovascular Prevention & Rehabilitation*. 2010 May;17(1\_suppl):s3-8.
- Yameny AA *et al.* Diabetes Mellitus: A Comprehensive Review of Types, Pathophysiology, Complications, and Standards of Care in Diabetes 2025. *Journal of Medical and Life Science*. 2025 Mar 20;7(1):134-41.
- Vanmathi. S. M Monitha Star. M, Jishala. M. I, Shanmuga Sundaram. R. A *et al.* Pathophysiological Approach of Macrovascular Complication in Diabetes Mellitus with Hypertension: A Systematic Review. *Research J. Pharm. and Tech* 2019; 12(2):901-906. doi: 10.5958/0974-360X.2019.00154.9
- Rayfield EJ, Ault MJ, Keusch GT, Brothers MJ, Nechemias C, Smith H *et al.* Infection and diabetes: the case for glucose control. *The American journal of medicine*. 1982 Mar 1;72(3):439-50.
- Abbas HA *et al.* Diabetic foot infection. *Research journal of pharmacy and technology*. 2015;8(5):575-9. Harini JU, Suneetha V. A *et al.* Study of Urinary Tract Infections in both Diabetic and Non diabetic Urine samples of IP and OP Clinical patients. *Research Journal of Pharmacy and Technology*. 2018 Sep 1;11(9):4084-9.
- Stapleton A *et al.* Urinary tract infections in patients with diabetes. *The American journal of medicine*. 2002 Jul 8;113(1):80-4.
- Klekotka RB, Mizgala E, Król W *et al.* The etiology of lower respiratory tract infections in people with diabetes. *Advances in Respiratory Medicine*. 2015;83(5):401-8.
- Pimpaldara RP, Vasava M, Pimpaldara R *et al.* Lower respiratory tract infection in diabetes mellitus. *Indian Journal of Immunology and Respiratory Medicine*. 2017 Jul;2(3):78-81.
- Reenu, S.P., Narayanaswamy, G., and Kushwaha, R.K *et al.*, 2023. Bacterial urinary tract infection in diabetes patients and evaluation for multidrug-resistant organisms. *IP International Journal of Medical Microbiology and Tropical Diseases*, 8(4), pp.317-323
- Shah BR, Hux JE *et al.* Quantifying the risk of infectious diseases for people with diabetes. *Diabetes Care*. 2003;26(2):510–513.
- Casqueiro J, Casqueiro J, Alves C *et al.* Infections in patients with diabetes mellitus: pathogenesis. *Indian J Endocrinol Metab*. 2012;16(Suppl 1):S27–S36.
- Kautzky-Willer A, Harreiter J, Pacini G *et al.* Sex and gender differences in type 2 diabetes. *Endocr Rev*. 2016;37(3):278–316.
- Lavery LA, *et al.* Risk factors for foot infections in individuals with diabetes. *Diabetes Care*. 2006;29(6):1288–1293.
- High KP, *et al.* Clinical infectious diseases and aging. *Clin Infect Dis*. 2009;49(10):1497–1503.
- Delamaire M, *et al.* Impaired leukocyte functions in diabetic patients. *Diabet Med*. 1997;14(1):29–34.
- Turina M, Fry DE, Polk HC *et al.* Acute hyperglycemia and innate immunity. *Surg Infect*. 2005;6(3):263–273.

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20. Long AN, Dagogo-Jack S *et al.*. Comorbidities of diabetes and hypertension. *Curr Diab Rep.* 2011;11(2):130–137.
21. Dalrymple LS, Go AS *et al.*. Infections among patients with chronic kidney disease. *Clin J Am Soc Nephrol.* 2008;3(5):1487–1493.
22. Armstrong DG, Boulton AJM, Bus SA *et al.*. Diabetic foot ulcers and recurrence. *N Engl J Med.* 2017;376:2367–2375.
23. Boulton AJM *et al.*. The diabetic foot: From art to science. *Diabetologia.* 2004;47(8):1343–1353.
24. Salari N, et al *et al.*. Prevalence of urinary tract infections in type 2 diabetic patients: meta-analysis. *Eur J Med Res.* 2022.
25. SpringerLink
26. Type 2 diabetes mellitus and antibiotic-resistant infections: systematic review and meta-analysis. 2022.
27. PubMed
28. Multifaceted antibiotic resistance in diabetic foot infections: systematic review. *Microorganisms.* 2025. MDPI
29. Efficacy of systemic antibiotics for DFI: systematic review. 2024. PubMed
30. American Diabetes Association. Standards of Medical Care in Diabetes. *Diabetes Care.* 2024.
31. Pellberg B, *et al.* Antimicrobial stewardship: Practical guidance for clinicians. *Clinical Infectious Diseases.* 2022;75(2):e168–e178.
32. American Diabetes Association. Standards of Care in Diabetes—2024. *Diabetes Care.* 2024;47(Suppl 1):S1–S350.
33. Lipsky BA, Senneville É, Abbas ZG, *et al.* Guidelines on the diagnosis and treatment of diabetic foot infections (2023 update). *Clinical Infectious Diseases.* 2023;76(3):e328–e357.
34. Geerlings SE, Hoepelman AIM *et al.* Immune dysfunction in patients with diabetes mellitus and infection risk. *Nature Reviews Endocrinology.* 2023;19(4):219–232.

**ABBREVIATIONS**

UTI- Urinary tract infections  
RTI-Respiratory tract infections  
DM- Diabetes mellitus  
T1D- Type 1 diabetes mellitus  
LADA -Latent autoimmune diabetes in adults  
T2D-Type II diabetes mellitus  
RBS-Random Blood sugar