

# Bacteriuria in Type 2 Diabetes Mellitus in a Rural Medical College

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**Abstract:** High blood sugar in type II Diabetic patient creates a fertile breeding ground for bacteria and leads to many complications and one among the commonest is urinary tract infection. So prompt and efficient treatment, a simple urinary analysis with a culture and biochemical reaction is must for early identification of bacteria for selecting appropriate treatment. Certain regions and area shows certain organisms dominant in UTI. Thus study was conducted to identify the most common organism causing UTI in type II DM in and around Annapoorana medical college and hospital, Salem.

**Keywords:** Diabetes, UTI, E. coli, Urine culture, Cystitis, HbA1c

## 1. Introduction

Urinary Tract Infection (UTI) possess a major challenge to physician and surgeon in medical practice especially if undetected leading to serious complications like septicemia, pyelonephritis and even to renal failure. Early detection of UTI in Diabetic patients helps us to prevent these complications. In this study, routine urine examination with culture and biochemical reaction of the bacteria done for early detection of urinary tract infection in Type 2 Diabetes Mellitus (DM) patients in and around Annapoorana Medical college and Hospitals rural area to find common bacteria causing UTI.

## 2. Material and Methods

It is a prospective study conducted over a period of six months in Department Of Pathology, Annapoorana Medical College and Hospitals, Salem (Tamilnadu) from June 2021- November 2021

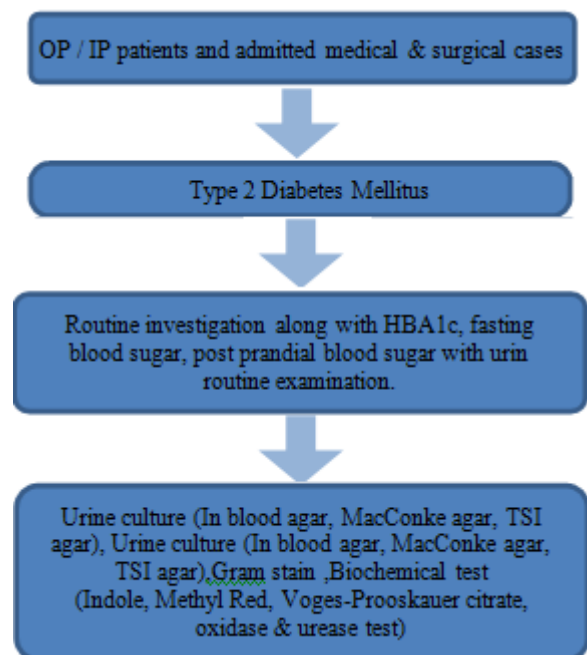
### Study Population

Patient coming to OPD medical, surgical and casualty in Annapoorana Medical College and Hospitals both old and new cases of Type 2 Diabetes Mellitus patients and admitted cases from rural areas.

### Method

Blood sample for fasting blood glucose, post prandial blood glucose and HbA1c (glycosylated hemoglobin) along with fresh urine sample in a sterile container for sugar, ketone, protein, microscopic examination and for culture is collected.

## 3. Flow Chart of the Method

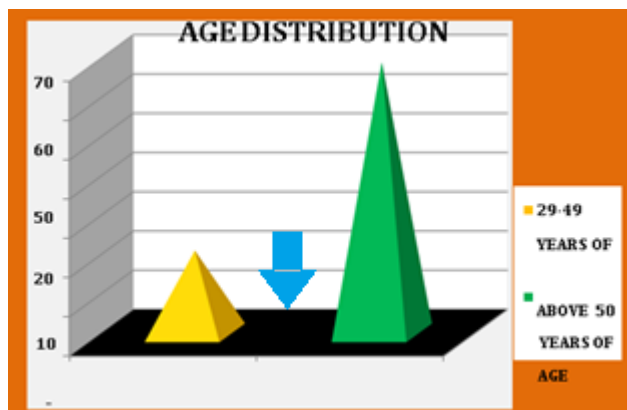


## 4. Results

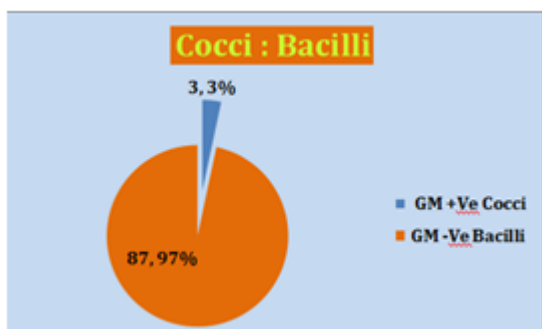
Total of 90 cases were studied in rural area in and around Annapoorana medical college and hospitals, Salem, TN.

### 4.1 Age

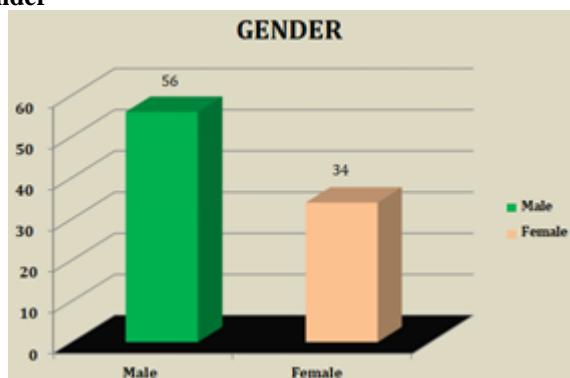
With increase in age UTI frequencies are also increase.



Gram Negative Bacilli causing UTI in Type 2DM is dormant bacteria.

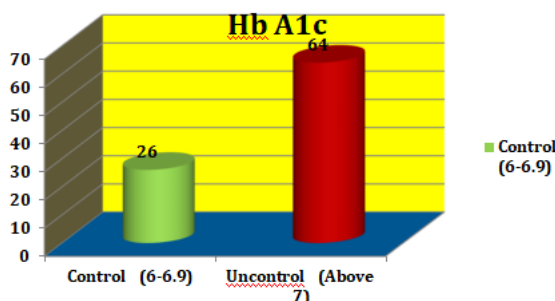


**Gender**



UTI were seen more in males with type 2 Diabetes Mellitus

**HbA1c**



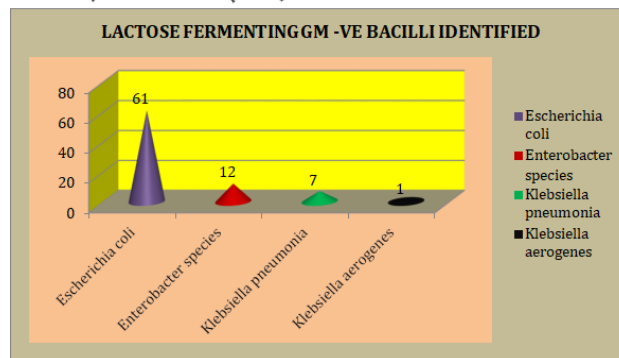
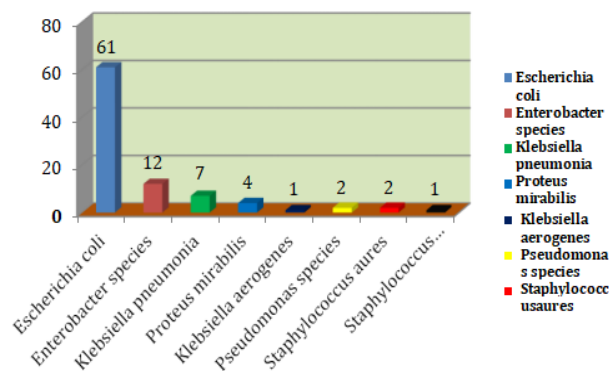
High level of glycosylated hemoglobin is directly related high incidence of UTI in type 2 diabetes mellitus

Different bacteria causing UTI in Type2DM are

- Escherichia coli
- Klebsiella pneumonia

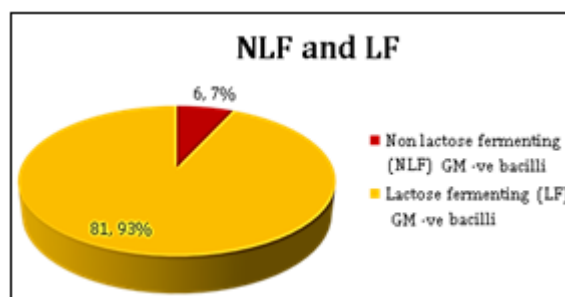
- Proteus mirabilis
- Klebsiella aerogenes
- Pseudomonas species
- Staphylococcus aureus
- Staphylococcus
- saprophyticus

**DIFFERENT BACTERIA IDENTIFIED**



Lactose fermenting gram negative bacilli are the most common bacteria causing UTI when compared to non lactose fermenting gram negative bacilli in type 2 DM

Among the lactose fermenting gram negative bacilli, E. coli is the most common bacilli



**5. Discussion**

- TYPE 2 DM is a heterogeneous group of disorder characterised by variable degree of insulin resistance, impaired insulin secretion and increased glucose production.
- Patients with Type 2 DM are at high risk of infection with urinary tract being the most frequent infection site.

## Pathogenesis

- High renal parenchyma glucose level creates a favourable environment for the growth and multiplication of microorganisms. Other factors that are found to enhance UTI in Type 2 DM are Age, Metabolic control, primarily diabetic nephropathy and cystopathy
- Recent American study performed on health service database with more than 70000 patients with Type 2DM found that 8.2% had UTI during one year.
- Danish study reported patients with DM were three times more likely to be hospitalised with pyelonephritis as compared to subjects with DM.

## 6. Complications

- The serious complications of UTI in Type 2DM such as emphysematous cystitis, pyelonephritis, renal abscess, renal papillary necrosis are encountered more frequently involved than in general population.
- Mortality from UTI is five times higher in patients with diabetes aged 65 years and older as compared to elderly control patients.

## 7. Organism

- The most common microorganism found was gram negative lactose fermenting bacilli of which E. coli is the dominant bacilli and in gram positive cocci-staphylococcus aureus is the most common organism conducted in rural area of Annapoorana Medical college and hospitals, Salem (Tamilnadu)
- Escherichia coli (E. coli) is the most common bacteria causing UTI in Type 2DM.
- E. coli belongs to a large group of gram negative rods referred to as enteric bacteria. They are naturally found in the intestinal tract in soil and water.
- E. coli is the most common pathogen isolated from patients with cystitis. Recurring infections are common in women.

### Enterohemorrhagic Coli (EHEC)

- It causes life threatening hemorrhagic diarrhoea (Colitis) in all ages without pus cells and fever. It can progress to hemolytic uremia syndrome with renal failure.
- E. coli is motile and facultative anaerobe. They are lactose fermenting producing smooth pink colonies in MacConkey Agar, Indole positive and methyl red positive.
- The culture sensitivity takes two to three days. As per our studies E. coli being the most common UTI causing bacteria, the treatment can be started after sending the urinary samples for culture without delay in order to prevent further UTI complications

## 8. Prevention

By controlling blood sugar level, metabolic control and early treatment with antibiotics detected against gram negative bacilli and controlling and managing diabetic nephropathy

## 9. Conclusion

The study shows the most common bacteria causing UTI in Type 2DM is E. coli. The empirical treatment with antibiotics against Gram Negative bacilli especially E. coli should be started at the earliest without further delay waiting for culture results in Type 2 Diabetes Mellitus.

### Conflicts of interest

Authors declare no conflicts of interest.

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