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# Bacteriological and demographic profile of geriatric Urinary tract infections at a tertiary care hospital

Dr. Abirlal Sanyal[1], Prof.(Dr.)Raja Ray[2], Prof.(Dr.)Manash Sarkar [3]
[1]*Senior Resident, Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata, West Bengal University of Health Sciences*
[2] *Professor and Head of the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata-700020.*
[3] *Professor and Head of the Department of Microbiology,Murshidabad Medical College and Hospital, Berhampore, Murshidabad, West Bengal.*
*Corresponding author: Prof. Dr. Raja Ray, Professor and Head of the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata-700020*

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**ABSTRACT:** Urinary tract infection (UTI) is the third most common community acquired infection in human, including the geriatric age group, warranting use of antimicrobials.A study of 2661 suspected UTI patients aged ≥ 60 years, antibiotic susceptibility test of culture confirmed cases were carried out over eighteen months at the department of Microbiology, IPGME&R and SSKM Hospital, Kolkata, West Bengal.Microbiological work-up were done as per standard recommendations. Antibiotic susceptibility test(AST)were carried out by modified Kirby-Bauer disc diffusion method as per Clinical and Laboratory Standards Institute(CLSI) guidelines, in lines with the commonly available antibiotics used in the specific clinical setting with emphasis on the potential problem areas of diagnosis and management.Escherichia coli was found to be the commonest etiological agent (46.8%)of geriatric UTI followed by Klebsiella pneumoniae (14.8%), Citrobacter spp. (10.2%). Gram positive cocci was involved in 10.6% cases. 15% isolates were non-fermenters. After analysis, the demographic profile of the study revealed Out of 2661 consenting suspected cases of geriatric UTI recruited in the study, 500 patients (18.79%) were deemed as 'culture confirmed geriatric UTI', 450 patients showed growth of 'contaminants' and 1711 patients revealed 'no growth'. The minimum age of patients in this study was 60 years and the maximum was 90 years.The mean age of the study population was 73.62 years.The Male and female percentage of culture confirmed cases of geriatric UTI in the study were 50.4% and 49.6% , respectively. The OPD and IPD percentage in 'culture confirmed UTI cases' were 76.6% and 23.4%, respectively.Demographic data and bacteriological profile of all UTI patients, with special emphasis on the more vulnerable age group are essential tools for case and cause based individualisation during treatment. This can lead to a better patient outcome.

**Keywords:** Urinary tract infections(UTI), Geriatric population, Antibiotics, Demography.

## I. INTRODUCTION

Ageing is an irreversible and incurable entity applicable to all living creatures on this planet.The process of ageing is as old as emergence of 'life',which is approximately 4 billion years[1].The world's population is ageing.

Ageing population and increased survival is one of the most significant societal transformations of the twenty-first century, with implications on nearly all sectors of society, including labor and financial markets, the demand for goods and services, transportation and social protection, as well as family structures, medical aid and intergenerational ties. Globally, population aged 60 or over is growing faster than all younger age groups.[2-4]

On one hand one of the biggest medical achievements of the 20th century is 'greater longevity'[3] , that has resulted in an increase in geriatric population, worldwide and which on the other hand is a bane exposing the elderly to several geriatric problems.With the reduction of self-care and hygiene, the elderly population become more prone to develop infections. Most of our elders have problems with 'voiding'. Unattended visit to the loo often result in 'falls'. The elderly group are very often restricted to bed for a considerableamount of time because of falls, mainly at the time of voiding , resulting in use of adult diapers or urinary catheters with occasional

development of Decubitus ulcers from prolonged immobilization ,associated with bed-wetting, cuts, bruises from bed-pan and fecal contamination, which leads to different types of infection, mainly Urinary Tract Infections, septicemia etc.. [4]

Urinary tract infection (UTI) is the third most common infection experienced by humans after respiratory and gastro-intestinal infections. In fact, bacterial infections of the urinary tract are the most common cause of both community acquired and nosocomial infections for patients of all age groups.[5]

The concept of 'significant bacteriuria' was proposed by Dr. E.H. Kass in the year 1957 to differentiate 'contamination' from 'infections' of the Urinary tract.[3] Significant Bacteriuria [7] is defined , quantitatively, as the presence of $10^5$ or more dominant monomorphic colony forming units (CFU) per ml of mid-stream urine (MSU) collected by clean catch method in a wide mouthed sterile container on a standard laboratory media.The "Kass Criteria" remained sacrosanct for decades, but eventually faced criticism and questioning and amendments from various scientific societies.Infectious Disease Society of America (IDSA) [7] gives a slightly more relaxed consensus definition requiring $10^3$ CFU per ml to diagnose cystitis and $10^4$ CFU per ml for pyelonephritis. The European Urological Association( EUA) in their guidelines on UTI hammered on the fact that no fixed bacterial count can be considered indicative for significant bacteriuria in all kinds of UTIs and under all circumstances . Currently, the counts of uropathogens in a midstream sample of urine (MSU) should exceed $10^4$ CFU/ml in men or vary from $\geq 10^3$ CFU/ml in acute uncomplicated cystitis till $\geq 10^5$ CFU/ml in women with complicated UTIs. The lower the colony counts in MSU the higher the likelihood of contamination. In a suprapubic bladder puncturespecimen, any count of bacteria is considered diagnostic.[8-10]Hence, UTI is defined quantitativelyas 'significant bacteriuria' with clinical symptoms, whereas qualitatively it has been defined as the presence of uropathogen in any part of the urinary tract.[3,20] Urinary tract infection (UTI) is the third most common infection [14] experienced by humans after respiratory tract and gastro-intestinal infections. In fact, bacterial infections of the urinary tract are the most common cause of both community acquired and nosocomial infections for patients admitted to hospitals worldwide. Incidence of UTI increases with age but is not considered as a part of the normal aging process.Polymicrobial UTIs may pose a heightened threat to the health and well-being of the elderly people. Symptomatic UTIs are the common outcome of such bacteriuria and are associated with increased risk for blood-stream infection and increased mortality. Achieving optimal management of UTIs among hospitalized and elderly populations is problematic since they contain high number of organisms with significant levels of antimicrobial resistance and high levels of invasiveness. Diagnosis requires demonstration of bacteriuria, exceptions to this include patients with pyogenic abscess of kidney or perinephric tissue, obstructed pyonephrosis or bacterial prostatitis in whom the urine may be sterile.

This study was aimed to assess the commonly isolated uropathogens in geriatric UTI with special reference to the antibiogram profile of the isolates with an ultimate aim to rationalise antibiotic therapy in this existently common infection.

## II. MATERIAL AND METHODS

This hospital based cross-sectional observational(analytical) study was carried out at the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata with involvement of 2661 geriatric patients of both sexes attending outdoor and indoor patient departments of our institution. After informed consent from the patient or patient's kin was taken, a pre-structured and pre-tested questionnaire was used to record the relevant data from the patients. (10)

**Study Design:** This study was a hospital-based, cross-sectional observational (analytical) study

**Study Location**: The study was carried out in the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata ,on clinical isolates collected from the patients at or above the age of 60 years with clinically suspected UTI, attending IPD and OPD of IPGME&R and SSKM Hospital, Kolkata-700020..

**Study Duration:** This study was carried out from January, 2016 to June, 2017 at the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata. Data recording was carried out monthly. Statistical analysis of the data was carried out in the months of August-September, 2017.

**Sample size:** The study recruited 2661 patients of suspected UTI after proper informed consent.

**Sample size calculation:** This study recruited consenting patients at or above the age of 60 years of both sexes, as per age group guidelines of United Nations Organisation (UNO) [6]

**Calculation of sample size (n):**Sample size (n) was calculated using the formula:

$$\mathbf{n= z_\alpha^2\ pq/l^2}$$

$z_\alpha$=1.96 when Confidence Interval (CI) is 95%, p=outcome percentage from previous study (50%), q= (1-p), l= allowable error (10%of p)

This study recruited 2661 patients at or above the age of 60 years of both sexes. The sample size which was initially targeted in the study was at least 300 patients.

**Subjects & selection method**: The study population was drawn from the patients attending OPD and admitted in the IPD of IPGME&R and SSKM Hospital,Kolkata, with suspected UTI, provided they fulfilled the inclusion and exclusion criteria. A proper informed consent was taken before recruitment.

**Inclusion criteria:**

1) The age of the patient should be at or above the age of 60 years.
2) The patients should be able to self void , not requiring urinary catherisation.
3) The patients should have classical or non-localising symptoms of UTI.
4) The patient should have attended Out-patient department (OPD) or be admitted at IPD of IPGME&R and SSKM Hospital, Kolkata-20.
5) The study would involve bacterial UTI only (except the fastidious, slow-growing or those requiring special media).

**Exclusion criteria:** (10 Bold)

1) Patients below the age of 60 years.
2) Patients on antibiotics.
3) Patients on Urinary catheter (Indwelling/Silicone/Latex) ,with recent history of Surgery or Instrumentation.
4) Patients with history of earlier hospitalization in the last 7 days and/or suffering from known bacterial infection.
5) Patients not giving Informed consent for the study

**Standard Operative Procedure(SOP):** Patients at or above the age of 60 years in the IPD and OPD of IPGME&R with 'localising' and 'non-localising' symptoms of UTI were recruited after proper explanation and consent preferably on Day-0 of attendance.Urine samples was collected and processed as per 'conventional' Microbiological procedures with the logistic support, available in our departmental laboratory.

The study was able to generate three subtypes of data for comparison and analysis:

1) Patients with culture confirmed geriatric UTI
2) Patient with growth of contaminants.
3) Patients with no growth of pathogens.

**Methods of data collection**

The samples in this study were collected after proper informed consent (from patient/patient's kin) and explanation of the same in lucid language, The Urine samples from the recruited patients would be processed as per 'conventional' Microbiological technique, with the logistic support available in our laboratory. The positive cultures would be identified, microscopically examined, run for biochemical tests followed by identification of the bacteria. The data were collected on a "Patient Data Collection Sheet", followed by statistical analysis by the appropriate tests and conclusions drawn.

**Study design**

Patients at or above the age of 60 years attending the IPD and OPD of IPGME&R with 'localising' and 'non-localising' symptoms of UTI were recruited , randomly, in this study.Urine samples would be collected and processed as per 'conventional' Microbiological procedures.. The isolation and identification of the uropathogen was done following the SOP.

**Parameters and procedures:**

**1. Patient selection:**

The patients , both male and female, at or above the age 60 years were selected as per inclusion and exclusion criteria from the In-Patient Departments(IPD)of Internal Medicine, Urology, Nephrology and Out- Patient Departments.

2. **Informed Consent:**

Before recruiting the patients for the study, an Informed consent form was supplied and explained in lucid language and after free written consent from the patient or his/her kin or next of kin, the subject was recruited in the study.

**3. Sample collection:**

Around ~10 ml of self-voided mid-stream, early morning Day-0 urine sample by clean catch method was collected in a sterile wide mouthed screw capped sterile container. Before sample collection,patients were explained about the process of collection in lucid language.

4. **Transport of Urine samples:**

Urine samples were processed immediately after collection. In exceptional cases, transport of samples were done maintaining the following guidelines:

1. Bacterial counts remains constant in refrigerated (4° C) urine for as long as 24 hrs.
2. Urine transport tubes – Urine Culture Kits containing boric acid, glycerol, sodiumformate. It can preserve sample with significant amount of bacteria without

refrigeration for 24 hours. Minimum sample of 3 ml was required.

**5. Wet mount examination :**

Wet mount examination was performed to look for pus cells, RBCs and casts. A loopful of well mixed urine placed on the glass slide (without spreading) can be stained by Gram stain and observed. Presence of single bacterium per oil immersion field in such a smear indicates significant bacteriuria. Screening test such as nitrate reduction, dipstick, tetrazolium reduction etc are not specific and are not routinely done. Leukocyte esterase dip test is helpful in detecting pyuria. A semi-quantitative culture was performed by calibrated loop method. A loopful of well-mixed uncentrifuged urine was inoculated on to MacConkey agar and Blood agar without sterilizing the loop in between and incubated at 37 ℃ for 16-18 hours under aerobic condition. The colony forming units(CFU) were counted and predominant colony morphotypes were selected for biochemical tests, identification and antibiotic susceptibility test(AST)

**6. Sample processing**

After proper collection, the urine samples were plated using pre-calibrated standard nichrome loops of volumes 0.04ml for semiquantitative method. This method has the advantage of providing information regarding the number of CFU/mL, as well as providing isolated colonies for identification and susceptibility testing. The types of media used were blood agar plate(BAP) and MacConkey agar(MAC). Urine cultures were incubated overnight(16-18 hours) at 35°C–37°C in ambient air before being read. The dominant colony morphotype was identified and isolation, identification and AST of the uropathogens were carried out as per Mackie and Mac Cartney's Textbook of Practical Medical Microbiology. Special media and special tests were incorporated as per requirement.

**7. Schedule of data collection**

Each Urine sample required about 36-48 hours of processing and evaluation, before reaching a diagnosis. Urine samples were collected throughout the study period. Patients were recruited from January, 2016 to June, 2017 (18 months).

8. **Statistical analysis**

The data from the 'Patient data collection sheet' was transferred to MS Excel sheets for descriptive and analytical statistical representation. The statistical analysis was carried out using the following software:

- Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001]
- SPSS Statistics version 17 [Illinois, Chicago: SPSS Inc., 2008]

The statistical tests applied were:

1. Unpaired t test.
2. Chi square test.The level $P < 0.05$ was considered as the cutoff value or significance.

## III. RESULTS

The study was carried out in the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata from January,2016 to June, 2017. During this 18 months of study, 2661 urine samples of suspected geriatric UTI patients were studied out of which 500 samples were ' New culture confirmed geriatric UTI cases', 450 samples showed 'Contaminants' and 1711 samples were 'Culture negative cases'.

The analysis of data pertaining to this study was done using the softwares, as mentioned before.Numerical variables were found to be normally distributed by **Kolmogorov-Smirnov goodness-of-fit test.**For ease of statistical analysis and comparison, the 'outcome' of urine culture was distributed in three groups:

**Table 1: Classification of the possible 'outcome'** .

| Groups | Outcome | Sample size (n) |
|---|---|---|
| **Group 1** | **New Culture confirmed geriatric UTI cases** | **n= 500** |
| **Group 2** | **Growth of contaminants.** | **n=450** |

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| | | |
|---|---|---|
| **Group 3** | **Culture negative cases** | **n= 1711** |

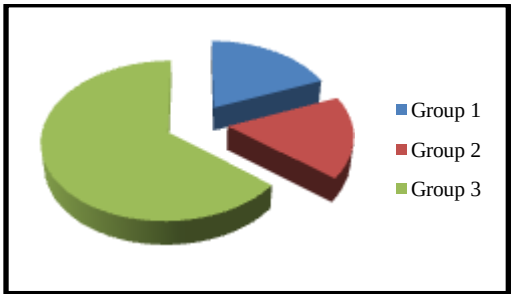


**Figure 1: Exploded 3-D pie diagram representing the 'outcome' groups.**

**Table 2 : Month wise number of urine samples accepted for the study and number ofculture confirmed cases:**

| Month, Year | Number of urine samples accepted for culture | Number of culture confirmed cases of geriatric UTI |
|---|---|---|
| January, 2016 | 147 | 27 |
| February, 2016 | 210 | 25 |
| March,2016 | 180 | 30 |
| April, 2016 | 141 | 22 |
| May, 2016 | 169 | 27 |
| June, 2016 | 201 | 29 |
| July,2016 | 148 | 29 |
| August, 2016 | 187 | 30 |
| September, 2016 | 150 | 26 |
| October, 2016 | 100 | 26 |
| November, 2016 | 140 | 31 |
| December, 2016 | 90 | 21 |
| January, 2017 | 203 | 36 |
| February, 2017 | 110 | 26 |
| March, 2017 | 103 | 21 |
| April,2017 | 130 | 31 |
| May. 2017 | 150 | 41 |
| June, 2017 | 100 | 22 |
| **Total** | **2661** | **500** |

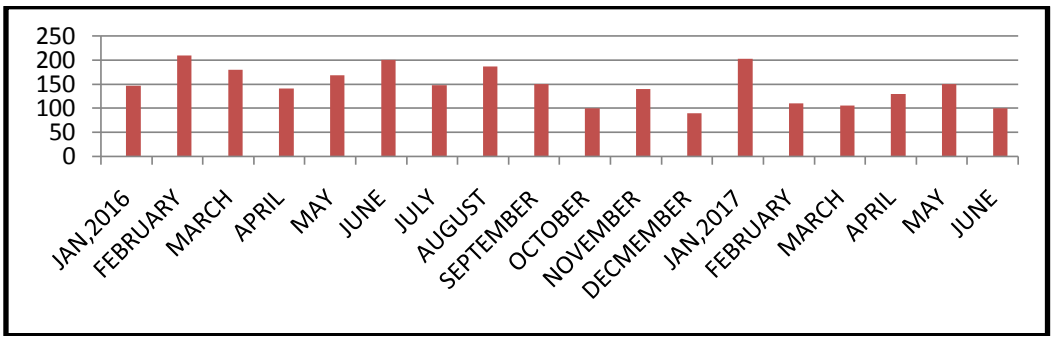


**Figure 2 : 2-D Column diagram representing the number of urine samples accepted per month from patients of suspected geriatric UTI.**

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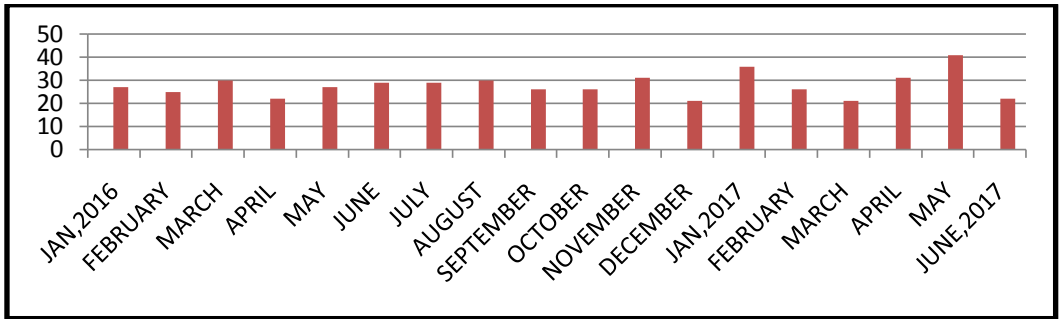


**Figure 3: 2-D Column diagram representing month wise distribution of 'Culture confirmed cases of geriatric UTI'**

**Table 2: Distribution of patients according to sex in different groups of the study**

| **Group 1 (Culture confirmed UTI cases)** | | **Group 2 (Culture with growth of contaminats)** | | **Group 3 (Culture negative cases)** | |
|---|---|---|---|---|---|
| **Male** | **Female** | **Male** | **Female** | **Male** | **Female** |
| **252 (50.40%)** | **248 (49.60%)** | 224 (49.78%) | 226 (50.22%) | 927 (54.18%) | 784 (45.82%) |
| **500** | | 450 | | 1711 | |
| **Total= 2661** | | | | | |

Chi-square test, p value 0.129. The male-female outcome was statistically not significant.

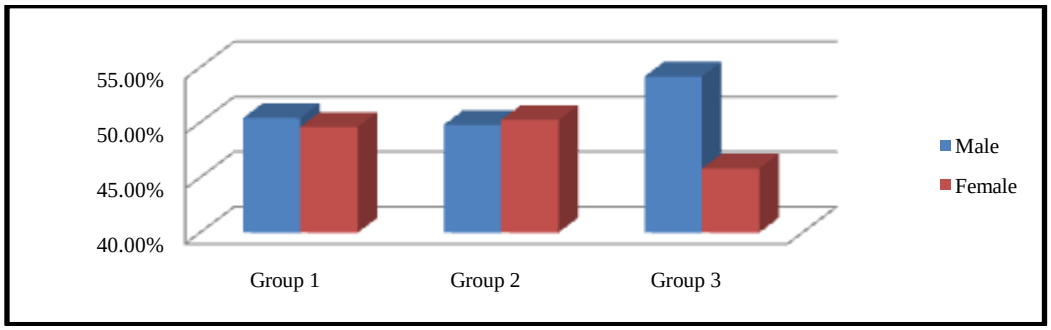


**Figure 4: 3-D Clustered column diagram showing distribution of patient according to sex in different groups of the study**

**Table 3: IPD-OPD distribution of the patients in different groups of the study**:

| **Groups** | **OPD patients (Row %)** | | **IPD patients ( Row %)** | | **Row Totals** |
|---|---|---|---|---|---|
| Group 1 (Culture confirmed UTI cases) | Male | Female | Male | Female | 500 |
| | 189 (37.8) | 194 (38.8) | 63 (12.6) | 54 (10.8) | |
| | | | | | |
| Group 2 (Culture showing contaminants) | Male | Female | Male | Female | 450 |
| | 168 (37.4)) | 169 (37.5) | 56 (12.4) | 57 (12.7) | |
| Group 3 (Culture negative cases) | Male | Female | Male | Female | 1711 |
| | 674 (39.4) | 606 (35.5) | 251 (14.6) | 180 (10.5) | |

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| | | | |
|---|---|---|---|
| Totals | **2000 (75.2)** | **661 (24.8)** | **2661** |

**(Figures in parenthesis represent percentage)**

Chi-square test, p value 0.710. The IPD-OPD 'outcome' distribution is statistically not significant.

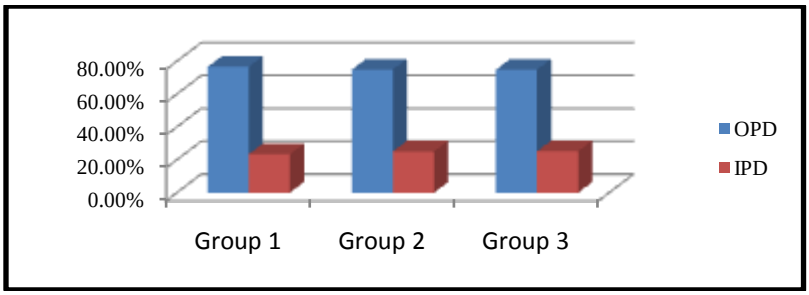


**Figure 5: 3-D Clustered column diagram representing IPD-OPD distribution of patientsin different groups of the study.**

**Table 4: Rural –Urban distribution of 'outcome':**

| Groups | Rural patients (Row %) | Urban patients (Row%) | Row Totals |
|---|---|---|---|
| **Group 1** | 266 (53.2%) | 234 (46.8%) | 500 |
| **Group 2** | 253 (56.22%) | 197 (43.78%) | 450 |
| **Group 3** | 812 (47.46%) | 899 (52.54%) | 1711 |
| **Totals** | 1331 | 1330 | 2661 |

**Chi-square test,p value 0.001. The rural-urban distribution of 'outcome' was statistically significant.**

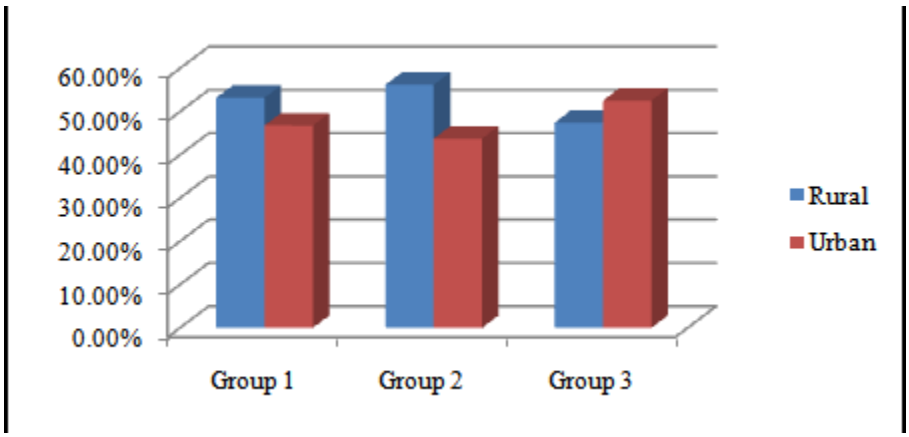


**Figure 6: 3-D Clustered column diagram representing the Rural-Urban distribution of 'outcome'.**

**Table 5: Distribution of age:**

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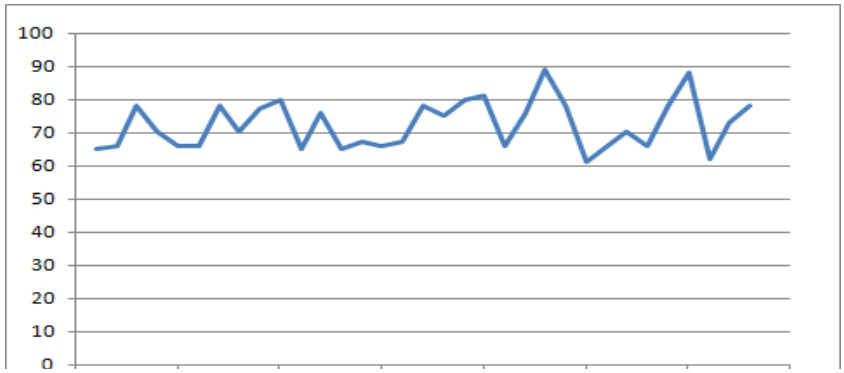


**Figure 6: The above line diagram depicts the age distribution of patients who showed 'Culture confirmed UTI'**

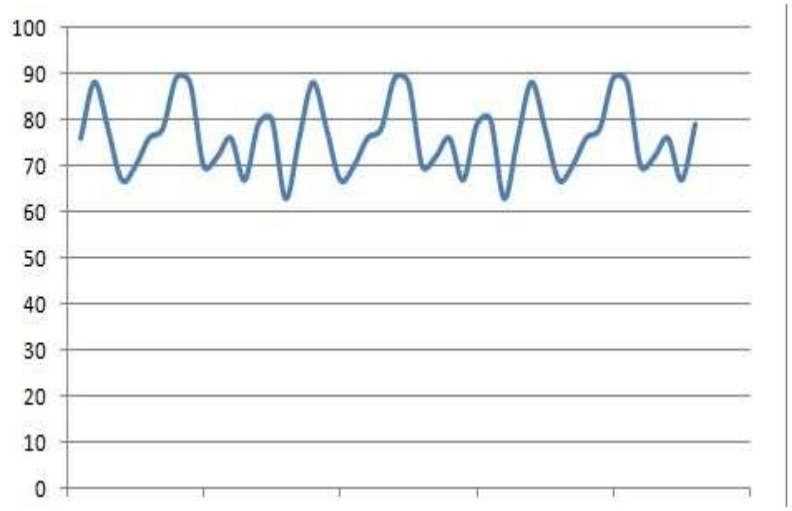


**Figure 7: The above line diagram depicts the age distribution of patients who showed 'Culture confirmed UTI'**

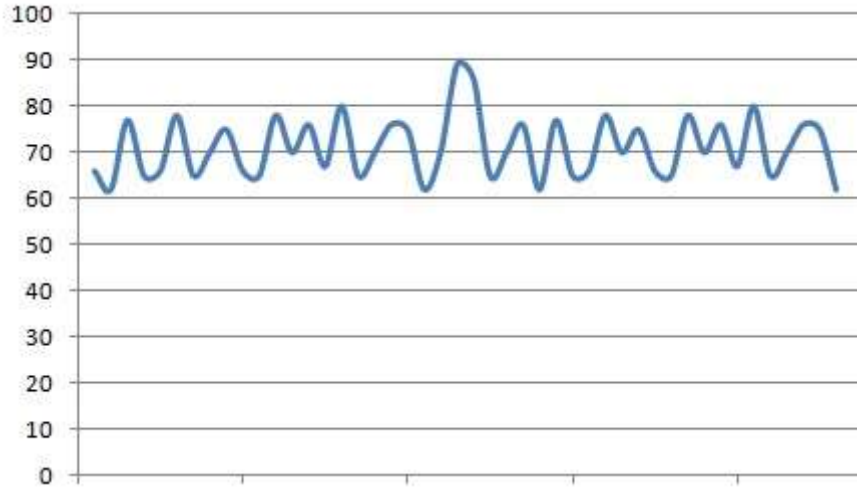


**Figure 8: The above line diagram depicts the age distribution of patients who showed 'no growth'**

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**Table 6 :Etiological distribution of the number and percentage of isolated uropathogens in culture confirmed cases of geriatric UTI (n= 500)**

| Uropathogens | Number of cases | Percentage |
|---|---|---|
| **Escherichia coli** | 234 | 46.80% |
| **Klebsiella pneumoniae** | 75 | 15.0 % |
| **Citrobacter koseri** | 53 | 10.60% |
| **Pseudomonas aeruginosa** | 39 | 7.80% |
| **Proteus mirabilis** | 26 | 5.2% |
| **Acinetobacter baumanii** | 16 | 3.20% |
| **Enterobacter spp.** | 2 | 0.40% |
| **Providentia spp.** | 2 | 0.40% |
| **MRSA** | 10 | 2% |
| **MSSA** | 3 | 0.60% |
| **Enterococcus fecalis** | 21 | 4.20% |
| **CONS** | 19 | 3.80% |
| Total | **500** | **100%** |

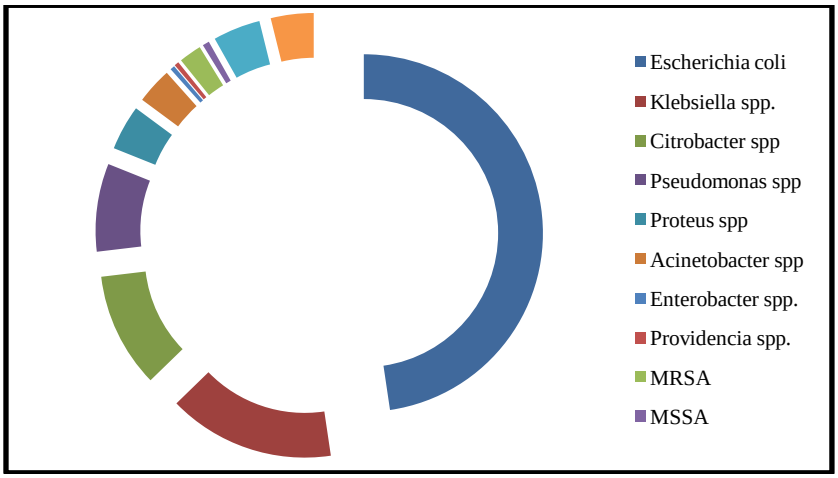


**Figure 9: The exploded doughnut diagram representing the uropathogens isolated from 'culture confirmed UTI cases'.**

## IV. DISCUSSION

The present hospital based observational(analytical) study of geriatric UTI with special reference to antibiogram profile was carried out at the Department of Microbiology, IPGME&R and SSKM Hospital, Kolkata from January, 2016 to June, 2017 and the major points of discussions are as follows:

Out of 2661 consenting suspected cases of geriatric UTI recruited in the study, 500 patients (18.79%) were deemed as 'new culture confirmed geriatric UTI'(Group 1), 450 patients showed growth of 'contaminants'(Group 2) and 1711 patients revealed 'no growth'(Group 3). The grouping was based on outcome of urine culture .

The Male and female percentage of culture confirmed cases of geriatric UTI in the current study were 50.4% and 49.6% , respectively, whereas sex ratio in Group 2 and 3 were 0.99:1 and 1.2:1 ,respectively. The overall number of male female patients had no statistical significance and did not alter the outcome of the study.

The overall percentage of attendance of OPD and IPD patients in the present study was 75.2% and 24.8%, respectively. The OPD and IPD percentage in 'culture confirmed cases was 76.6% and 23.4%, respectively. The IPD-OPD patient number showed no statistical significance and did not hinder study outcome.

The residential region i,e. the Rural and Urban ratio was noted to be 1:1 and was statistically significant (**Chi square test, p value <0.001**) and had some effect on the study outcome.

The minimum age studied was 60 years and the maximum was a 90 year old gentleman.The mean age of the study population was 73.62 years, all 3 groups taken together.

Escherichia coli was the commonest etiological agent (46.8%)of geriatric UTI , followed by Klebsiella spp.(14.8%), Citrobacter spp. (10.2%). GPC was involved in 10.6% cases. 15% isolates were non-fermenters.

The AST results revealed a high incidence of AMR in geriatric UTI patients. E.coli showed 56.8% resistance to amikacin, 35% to carbapenems, 59.8% to most cephalosporins, however remained sensitive to Polymixins, Fosfomycin.Citrobacter spp., Klebsiella spp., Proteus spp. showed a similar picture of antimicrobial resistance barring Pseudomonas aeruginosa which had a better antibiogram pattern. 76.9 % of isolated Staphylococcus aureus and all isolated CoNS were methicillin resistant, 50-57% of the isolated Enterobacteriaceae were found to be ESBL producers and around 35%-60% were Carbapenem resistant.

## V. CONCLUSION

Urinary tract infection (UTI) is the third most common infection in human, including geriatric age group. Adverse drug reactions(ADR) of most antibiotics can scar the ageing urinary tract. Immobilization, pressure sores, chronic disease, bone injuries, fecal contamination, lack of timely and proper medical attention make them more prone to infections like UTI. Symptomatology of UTI in the elderly might not conform to the classical symptom complex. Bacteria are adapting and mutating under antibiotic selection pressure. Newer antibiotics are scarce. Case and cause-based individualization is the need of the hour. Support to the aged from society and family, Government institutions, non-governmental organizations, support groups, gerontologists and geriatricians is expected in modern India. Multi-disciplinary co-ordination can reduce morbidity and mortality amongst the elderly. Proper, prudent and timely anti-microbial administration after consultation with the Medical microbiologists, antibiotic stewardship, antibiotic switch, institutional antibiotic policy, selective in-patient admission and periodic renal, hepatic, cardiac monitoring can bring some solution to the problems. Inter-departmental information-education - communication could help in a more dignified ageing process. As responsible citizens and medical professionals of modern India, we should be more cautious and sensitive in dealing with aged population. Lending our supportive hand to the aged population , making our towns, cities and transport more geriatric friendly, bringing necessary changes in our health care delivery system and last but not the least, a social and economic overhauling of our attitude towards the elderly are essential. The treating physician should ideally send urine samples to the Bacteriology laboratory for urinalysis and culture , before antibiotic administration and consult with the Medical microbiologist before prescribing or changing antimicrobials in suspected or confirmed cases of UTI.

We should keep this in our mind that a nation is known by the way her children , women , aged and the differently abled population gets treated.

## REFERENCES

[1]. DeLong E, Pace N. Environmental Diversity of Bacteria and Archaea. Systematic Biology.2001; 50(4):470-478.

[2]. Lena A, Ashok K, Padma M, Kamath V, Kamath A. Health and social problems of the elderly:A cross-sectional study in Udupi Taluk, Karnataka. Indian J Community Med.2009;34(2):131.

[3]. Kass E. Bacteriuria and the Diagnosis of Infections of the Urinary Tract. AMA Archives of Internal Medicine. 1957;100(5):709.

[4]. Nicolle L. Urinary tract infections in older people.Reviews in Clinical Gerontology. 2008;18(02):103

[5]. Banerjee A, Nikumb V, Thakur R. Health Problems Among the Elderly: A Cross-Sectional Study. Annals of Medical and Health Sciences Research. 2015;3(1):19.

[6]. United Nations Official Document [Internet]. Un.org. 2017 [cited 1st February

2019]. Available from: http:// www.un. org/ en/ga/ search/ view_ doc.asp? symbol= A/RES/47/5

[7]. Woodford H, George J. Diagnosis and management of urinary infections in older people. Clinical Medicine. 2011;11(1):80-83.

[8]. Akram M, Shahid M, Khan A. Etiology and antibiotic resistance patterns of community-acquired urinary tract infections in J N M C Hospital Aligarh, India. Annals of Clinical Microbiology and Antimicrobials. 2007; 6(1):4.

[9]. Somashekara S, Deepalaxmi S, Govindadas D, Jagannath N, Laveesh M, Ramesh B. Retrospective analysis of antibiotic resistance pattern to urinary pathogens in a Tertiary Care Hospital in South India.J Basic Clin Pharma. 2014;5(4):105.

[10]. Kempegowda P, Eshwarappa M, Dosegowda R, Aprameya I, Khan M, Kumar P. Clinico-microbiological profile of urinary tract infection in South India. Indian J Nephrol. 2011;21(1):30.

[11]. Prakash D, Saxena R. Distribution and Antimicrobial Susceptibility Pattern of Bacterial Pathogens Causing Urinary Tract Infection in Urban Community of Meerut City, India. ISRN Microbiology. 2013;2013:1-13.

[12]. CLSI. Performance Standards for Antimicrobial Susceptibility Testing.27th ed. CLSI supplement M100. Wayne, PA: Clinical and Laboratory Standards Institute; 2017.

[13]. WinnWCjr, Allen SD, JandaWM, Koneman EW, Procop GW, Schreckenberger PC, Woods GL, editors. Koneman's color atlas and textbook of diagnostic microbiology.7th ed.Washington: Lippincott Williams & Wilkins;2016:1443-75.

[14]. Cruickshank R. Pract. Medical microbiology. Edinburgh: Churchill Livingstone; 1980.

[15]. Microbiological Profile and Antibiogram of Bacterial Isolates Causing Urinary Tract Infection i n Tertiary Care Hospital. IOSR Journal of Dental and Medical Sciences (IOSR – JDMS). 2016;15(9):145-149.

[16]. Shaini J, C. M, Rashid M. Study of Antibiotic Sensitivity Pattern in Urinary Tract Infection at a Tertiary hospital. NJIRM. 2017;2(3).

[17]. J.G.Collee. R.S.Miles. B.Watt. Tests for the identification of bacteria. In: J.G. Collee, B.P.Marimon, A.G. Fraser, A. Simmons, editors. Mackie & McCartneyPractical Medical Microbiology. 14th ed. Churchill livingstone. new York; 1996:132-49.

[18]. Jameson J, Fauci A, Kasper D, Hauser S, Longo D, Loscalzo J et al. Harrison's principles of internal medicine. 19th ed. New York: Mc Graw Hill; 2012

[19]. Singh Z. Aging: The triumph of humanity-are we prepared to face the challenge?. Indian J Public Health 2012;56:189-95

[20]. Sobel J D , Kaye D. Urinary tract infections. In Gerald L. Mandell, John E. Bennett, Raphael Dolin. Editors. Mandell, Douglas, and Bennett's principles andpractice of infectious diseases.7th ed.Philadelphia: Churchill livingstone; 2010: 964.