STUDY OF BACTERIA CAUSING URINARY TRACT INFECTION AND THEIR ANTIMICROBIAL RESISTANCE TREND AT NATIONAL PUBLIC HEALTH LABORATORY

A
DISSERTATION
SUBMITTED TO THE CENTRAL DEPARTMENT OF MICROBIOLOGY
TRIBHUVAN UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN MICROBIOLOGY (MEDICAL)

BY
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2007

RECOMMENDATION

This is to certify that **Miss PADMA SHRESTHA** has completed this dissertation work entitled "**Study of bacteria causing urinary tract infection and their antimicrobial resistance trend at National Public Health Laboratory"** as a partial fulfillment of Master of Science Degree in Microbiology under our supervision. To our knowledge, this work has not been submitted for any other degree.

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On the recommendation of **Ms. Shaila Basnyat and Prof. Dr. Sarala Malla,** this dissertation work of **Miss Padma Shrestha,** entitled "**Study of bacteria causing urinary tract infection and their antimicrobial resistance trend at National Public Health Laboratory"** has been approved for the examination and is submitted to the Tribhuvan University in the Partial fulfillment of the requirements for **Master of Science Degree in Microbiology (Medical).**

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ABSTRACT

The present study was conducted at National Public Health Laboratory, Teku from May to September 2006 with the objectives to isolate bacteria causing urinary tract infection and to determine their antimicrobial resistance trend. During this period, three hundred and fifty two mid-stream urine samples collected were investigated by conventional semi-quantitative culture technique, microscopy and antibiotic susceptibility test.

Only 22.7% (80/352) of the samples showed significant bacterial growth. Status of bacteriuria was found higher in females (29.8%) than in males (15.2%). Association of significant bacteriuria and gender of patients was found to be statistically significant ($P<0.05$). Status of bacteriuria was found higher in age group 21-30 (21.6%) followed by 31-40 (18.8%).

Altogether 11 different bacteria were isolated among which *Escherichia coli* (48.8%) was found the most predominant organisms followed by *Klebsiella pneumoniae* (18.8%), *Proteus mirabilis* (7.5%), *Proteus vulgaris* (6.3%), Coagulase-negative Staphylococci (5.0%), *K. oxytoca* (3.8%), *Enterobacter* spp. (3.8%), *Citrobacter freundii* (2.5%), *Acinetobacter* spp. (1.3%), *Alcaligenes* spp. (1.3%) and *Staphylococcus aureus* (1.3%).

Predictors concerning pus cell count (≥5/HPF) and RBC count (≥3/HPF) were analyzed to determine the positive predictive value (PPV) in relation to the significant bacteriuria. Positive predictive value for pus cell count was found to be higher (77.8%) than that of RBC count (39.6%).

Gram negative bacilli showed best susceptibility towards gentamicin (80.0%) followed by ceftriazone (76.0%) whereas ampicillin was found out to be the least effective drug. Nitrofurantoin (100.0%) was found to be the most effective against Gram positive bacteria.

Multidrug resistance (MDR) was observed in 45.0% (36/80) of total bacterial isolates. Multidrug resistance was found to be 51.3% (20/39) in *E. coli* and that in *Klebsiella pneumoniae* was 33.3 % (5/15). Higher rate of MDR was found in males (57.7%, 15/26) than in females (38.8%, 21/54). Among the MDR *E. coli* isolates, 100.0%, 90.0% and 65.0% were resistant to ampicillin, norfloxacin and cotrimoxazole respectively. Among the MDR *K. pneumoniae* isolates, 100.0% were resistant to ampicillin, cotrimoxazole and norfloxacin.

Key words: bacteriuria, urinary tract infection, mid-stream urine, pyuria, multidrug-resistance

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LIST OF ABBREVIATIONS

µg	:	Microgram
A/A	:	Acid/ Acid
Alk/A	:	Alkali/ Acid
AUC	:	Acute Uncomplicated Cystitis
BA	:	Blood Agar
CA-UTI	:	Community Acquired Urinary Tract Infection
CFU	:	Colony Forming Units
CoNS	:	Coagulase Negative Staphylococci
DNA	:	Deoxyribonucleic Acid
DoHS	:	Department of Health Services
EC	:	European Commission
ESBL	:	Extended spectrum beta-lactamases
GISA	:	Glycopeptide-intermediate *Staphylococcus aureus*
Gm	:	Gram
H_2S	:	Hydrogen Sulphide
HPF	:	High power field
Hrs	:	Hours
LF	:	Lactose fermenting
MA	:	MacConkey agar
MDR	:	Multidrug Resistance
MHA	:	Mueller Hinton Agar
MIC	:	Minimum Inhibitory Concentration
Min	:	Minutes
ml	:	Milliliter
MoPH	:	Ministry of Public Health
MR	:	Methyl Red
MRSA	:	Methicillin-resistant *Staphylococcus aureus*
MSU	:	Mid-stream urine
NA	:	Nutrient agar

NCCLS	:	National Committee for Clinical Laboratory Standards
NLF	:	Non-lactose fermenting
No.	:	Number
NPHL	:	National Public Health Laboratory
NPV	:	Negative Predictive Value
PABA	:	Para-amino benzoic acid
PBP	:	Penicillin binding protein
PNSSP	:	Penicillin Non-Susceptible *Streptococcus pneumoniae*
PPV	:	Positive Predictive Value
RBC	:	Red Blood Cells
RNA	:	Ribonucleic Acid
rpm	:	revolution per minute
RS	:	Renal Stone
SIM	:	Sulphide Indole Motility
TMP/SMX	:	Trimethoprim-Sulphamethoxazole
TSI	:	Triple Sugar Iron
TUTH	:	Tribhuvan University Teaching Hospital
UK	:	United Kingdom
UPEC	:	Uropathogenic *Escherichia coli*
US	:	United States
UTI	:	Urinary Tract Infection
VP	:	Voges Proskauer
VRE	:	Vancomycin-resistant Enterococcus
VUR	:	Vesicoureteral Reflux
WBC	:	White Blood Cells
WHO	:	World Health Organization

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