STUDY ON THE INCIDENCE OF URINARY TRACT INFECTION IN DIABETIC PATIENTS AND THE PREVALENCE OF MULTIDRUG RESISTANT STRAINS AMONG THE BACTERIAL PATHOGENIC ISOLATES

A

DISSERTATION

SUBMITTED TO THE CENTRAL DEPARTMENT OF MICROBIOLOGY

TRIBHUVAN UNIVERSITY

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

BY

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2006

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ACKNOWLEDGEMENT

Respectfully, I am indebted to my supervisor, **Mr. Binod Lekhak**, Assistant Professor of Central Department of Microbiology, Tribhuvan University for his guidance and cooperation for the completion of this dissertation. I am equally obliged to my supervisor, **Ms. Reshma Tuladhar,** Assistant Professor of Central Department of Microbiology, Tribhuvan University for her guidance and constant encouragement for the accomplishment of this dissertation

I am grateful to my supervisor **Prof. Bharat Jha**, Assistant Dean of Tribhuvan University Teaching Hospital for providing a rewarding workplace and his inspiration and suport. I would like to express my sincere gratefulness to my supervisor **Dr. Ram Chandra Adhikari**, Pathologist, Pathology Department, "OM" Hospital and Research Center for his inspiration, tremendous support, invaluable suggestions and continuous guidance during my research work.

I am much obliged to honorable Head of Department **Dr. Anjana Singh**, **Prof. Dr. Sheetal Raj Basnyat, Dr. Prakash Ghimire** and **Ms. Shaila Basnyat** and all the teachers and staffs of Central Department of Microbiology, Tribhuvan University, all of whom have been very generous and motivating.

I am indebt to teachers especially **Mr. Nabaraj Pokhrel** and staffs especially **Mr. Dinesh Pandey** of National college (NIST) for their overwhelming support during the work, in absence of which I would have been unable to complete the work.

I wish to extend my sincere gratitude towards **Dr. Yogendra Prasad Deo**, Pathologist and to all the staffs of Pathology laboratory of "OM" hospital and research centre, especially **Pankaj Deo, Anjana Panchakoti** and **Kamala Niraula** for their support, cooperation and encouragement in the process of completing the work. I am also thankful to all the patients for their participation and cooperation during the work.

I wish to express my admiration and special thanks to all the friends for their support and encouragement especially to **Rajdeep Bomjan, Bikash Shakya, Jyoti Pant, Dhan K. Pant** and **Shova Khanal** who assisted me with the completion of this work.

My acknowledgement goes to my brother **Nimesh Puri** and his friends for their help during computer settings.

Finally, I admire my parents for their moral support and attention in achieving the present academic position.

It gives me immense pleasure to express my heartfelt appreciation to all the people who helped me in one way or another to complete my research work.

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ABSTRACT

Diabetes is a chronic disorder of carbohydrates, fat and protein metabolism due to insulin deficiency and /or insulin resistance. It has been noted that diabetic patients can have severe medical complications. Urinary tract infections (UTI) are very often encountered in patients with diabetes mellitus. They may present themselves as asymptomatic bacteriuria, but may also lead to more serious infection.

Urinary tract infection is a common medical problem; sometimes, leading to the number of deaths either from acute infection or from chronic renal failure. Bacteriological examination of the urine is an important tool in the diagnosis of infection.

This study was conducted in "OM" Hospital and Research Center, Kathmandu among diabetic patients suspected of UTI from March 24, 2006 to June 13, 2006. The aim of this study was to investigate the incidence of UTI in diabetic patients, etiology of UTI, antibiotic susceptibility profile, to isolate the multi-drug resistant strains (MDR-strains) and to compare the results with control patients.

Altogether, 100 samples from diabetic patients as test and 100 samples from nondiabetic patients as control were included in this work, which were investigated by glucose oxidase test for blood sugar level, conventional semi-quantitative culture technique, pus cell count, red blood cell count, epithelial cell count and albumin test for detection of UTI.

Out of 100 test urine samples, 22.0% showed significant growth while 4.0% samples showed mixed growth and 8.0% showed non significant growth. Out of 100 control urine samples, 12.0% showed significant growth while 1 sample showed mixed growth and 2.0% showed non significant growth. The highest number of growth positive samples from test 7 (31.8%) and from control patients 3 (25.0%) belonged to the same age group 51-60 years. Also, among the 22 isolates from test, 13 (59.5%) and among 12 isolates from control, 10 (83.3%) were from female patients. *Escherichia coli* was found to be the most predominant isolate (40.9%) followed by *Citrobacter fruendii* (27.2%) and *Staphylococcus aureus* (18.1%) in test and in control it was 83.3%.

Out the total isolates, 20 (90.9%) in test and 9 (75.0%) in control patients were MDR. In case of test out of 9 *E. coli* isolates, 8 were MDR-strains while all the isolates of *Citrobacter fruendii, Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Proteus vulgaris* and out of four *S. aureus* isolates, three were MDR strains. Nitrofurantoin was found to be the most effective drug for all Gram negative isolates followed by Ofloxacillin. Erythromycin was the drug of choice for Gram positive isolates.

Microscopy for pyuria showed the sensitivity of 59.0% vs 66.6% and specificity of 93.5% vs 96.5% in diabetic and control patients respectively. Similarly albuminuria showed sensitivity of 59.0% vs 66.6% and specificity of 89.7% vs 92.0%. Higher proportion of positive cases seen among test patients was found to be statistically non significant ($P>0.05$) with control patients, whereas no significant association was found between MDR and non MDR strains and significant and non significant pyuria between test and control patients.

Keywords: diabetes, urinary tract infection, mid-stream urine, multi-drug resistance, pyuria

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LIST OF ABBREVIATIONS

ADA	American Diabetes Association
ASB	Asymptomatic Bacteriuria
ATCC	American Type Culture Collection
BA	Blood Agar
BMI	Basal Metabolic Index
CC-MSU	Clean Catch Mid Stream Urine
CFA	Colonization Factor Antigens
CFU	Colony Forming Units
CONS	Coagulase Negative Staphylococci
CRF	Coagulase Reacting Factor
dl	Decalitre
DM	Diabetes Mellitus
DNA	Deoxyribonucleic Acid
FN	False Negative
FP	False Positive
HPF	High Power Field
IDSA	Infectious Diseases Society of America
IDDA	Insulin Dependent Diabetes Mellitus
L	Litre
LPF	Low Power Field
MA	MacConkey Agar
MDR	Multi-drug Resistant
MHA	Mueller Hinton Agar
mmol	Millimolar
µl	Microlitre
MODY	Maturity Onset Diabetes in Youth
MRSA	Methicillin Resistant *Staphylococcus aureus*
MRVP	Methyl Red Voges Proskauer

MSU	Mid-Stream Urine
NA	Nutrient Agar
NB	Nutrient Broth
nm	Nano Meter
NCCLS	National Committee for Clinical Laboratory Standards
NIDDM	Non Insulin Dependent Diabetes Mellitus
NNIS	National Nosocomial Infections Surveillance
ONPG	*o*-nitrophenyl-β-D-galactopyranoside
OPD	Out Patient Department
PAF	Prostatic Antibacterial Factor
PAP	Pyelonephritis-Associated Pili
PBP	Penicillin Binding Protein
PDA	Phenylalanine Deaminase
PPG	Post Prandial Glucose
PPN	Predictive Value of Negative Test
PPV	Predictive Value of Positive Test
QREC	Quinolone Resistant *Escherichia coli*
RBC	Red Blood Cell
RIA	Radio Immuno Assay
SDA	Sabouraud Dextrose Agar
SIM	Sulfide Indole Motility
TMP-SMX	Trimethoprim-Sulfomethaxole
TN	True Negative
TP	True Positive
TPD	Tetramethyl *p*-phenylene diamine dihydrochloride
TSIA	Triple Sugar Iron Agar
TUTH	Tribhuvan University Teaching Hospital
UTI	Urinary Tract Infection
WBC	White Blood Cell
WHO	World Health Organization

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