Incidence and resistance pattern of bacteria associated with urinary track infection in Pakistan

BY

Mahvish kabir

ID: 15001254005

SUPERVISOR

Dr. Muhammad Sohail Afzal

Department of Life Sciences

School of Science

University of Management and Technology,

Lahore, Pakistan

2017

INCIDENCE AND RESISTANCE PATTERN

OF BACTERIA ASSOCIATED WITH URINARY TRACK INFECTION IN PAKISTAN

Submitted to University of Management and Technology Lahore

In partial fulfillment of the requirements for the award of degree of

MS

IN

BIOTECHNOLOGY

BY

MAHVISH KABIR

ID

1	5	0	0	1	2	5	4	0	0	5

Session: 2015-2017

Department of Life Sciences

School of Science

University of Management and Technology,

Lahore, Pakistan

In the name of

ALLAH,

The most Compassionate,

The most Merciful

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis titled, **"Incidence and Resistance Pattern in Bacteria Associated with Urinary Track Infections in Pakistan"** has been carried out and completed by Mahvish Kabir, ID: 15001254005. The quantum and the quality of the work contained in this thesis are adequate for the award of degree of MS.

Supervisor

Dr. Muhammad Sohail Afzal

External Examiner

Dr. Nouman Rasool
Chairperson,
Department of Life Sciences
UMT, Lahore

Dr. Muhammad Azhar Iqbal
Dean
School of Science
UMT, Lahore

DECLARATION

I Mahvish Kabir D/O Muhammad Kabir ID: 15001254005 Session 2015-2017 have declared that the matter printed in the thesis dissertation titled "**Incidence and Resistance Pattern in Bacteria Associated with Urinary Track Infections in Pakistan**" which I here with submit for the research qualification for **MS DEGREE IN BIOTECHNOLOGY** to the Department of Life Sciences, School of Science, University of Management and Technology, Lahore, Pakistan. This work has recognized assistance of my supervisors, my own work and has not been previously submitted as research work, thesis or publication in any form in any University, research institution etc. in Pakistan or abroad to obtain a research diploma or degree.

_____

(Candidate)

Dated: _____

_____

(Supervisor)

DEDICATION

I dedicate this thesis to Dr. Muhammad Sohail Afzal. He is the sole motivation behind this research.

And

I also dedicate this piece of research work to my helper at home, mother and husband (Bilal Haider) for their unconditional support, prayers and patience.

ACKNOWLEDGEMENTS

All praises to Allah, for granting me ability and strength to complete this research successfully.

I would like to thank to my supervisors, Dr. M. Sohail Afzal for his continuous support in my MS study and related research. He was a source of motivation and immense knowledge. His guidance kept me going all the time in research and writing this thesis. I would not be able to accomplish this work without him in my MS study.

Besides my advisors, I would like to thank the rest of my thesis committee: Prof. Dr. M. Azhar Iqbal (Dean School of Science), Dr. Nouman Rasool (Chairperson Department of Life Sciences), for their understanding and encouragement, but also for their support which helped me to widen my research from diverse viewpoint.

I also appreciate my other teachers, friends and family for their time, sweat and gratuitous support. I want to give a special thanks to my helper at home Rubab for her constant hard work and patience. Last but not the least I want to thank my parents, husband and every person who is part of my life and is a source of inspiration. May Allah bless all of us and keep us safe.

MAHVISH KABIR

TABLE OF CONTENTS

Title **Page no.**

List of Tables

List of Figures:

ABSTRACT

Background: Urinary track infection is on of the most common type of infection in Pakistan. Poor knowledge about personal hygiene, lack of awareness about diet and unavailability of clean drinking water are major reasons of this infection. Varieties of infectious agents are responsible for UTI incidence but in present study *E. coli* and *K. pneumonia* were main causative agent of infection in majority of cases. This high prevalence of *E. coli* and *Klebsiella* in UTI patients is because of its resistance towards different antibiotics. These strains contains β-lactamases enzyme which provides resistance to β-lactam antibiotics. Prevalence and incidence of these bacteria is different in different region of the world. In present study bacterial resistance and susceptibility has been determined in UTI produced by *E. coli* and *Klebsiella* species against different antibiotics.

Method: Total 250 samples were obtained from patients suffering from urinary track infection from Genomic Research Lab and Diagnostic Center Rawalpindi, Pakistan. The samples were tested for presence of different microbial infectious agents. Samples had been tested for the presence of different pathogenic bacteria by using various kinds of biochemical test such as Gram staining, Lactose fermentation test, Motility test, Catalase test and Colony formation on MacConkey agar, Indole test, Citrate utilization test. The susceptibility pattern and resistance pattern had also been evaluated by using fourteen different antibiotics. Mullar Higton agar was used for the determination of susceptibility and resistance pattern. The susceptibility and resistance pattern had also been determined for each type of bacterial strain. The effect of each antibiotic had been tested on various samples and results were compiled to determine which antibiotic was most effective against UTI.

Result: Fourteen antibiotics were used for susceptibility while ten antibiotics were selected at a cut off value of 100 samples for *E. coli* and 20 samples for *Klebsiella*, then these samples were tested and their results were compared against each type of antibiotic on *E. coli* and *K. species.* The result showed that the effect of one antibiotic against various infection agents was not same its susceptibility varies with the type of infectious microbe. Over all, the most susceptible antibiotic was Amikacin with 93.5% susceptibility while the most resistant was shown against Ciprofloxacin with 76.8% resistance. The results in case of *E. coli* showed that the most susceptible antibiotic was Imipenam with 97.5% susceptibility and most resistance was against Ciprofloxacin 81.7% resistance. Where as against *K. species* most susceptible antibiotic was Amikacin with 94.9% susceptibility and most resistant was against Tobramycin with 76.1% resistance..

Conclusion: It is concluded from the present study that the effect of each antibiotic is different with respect to type of infectious agent; therefore, it is recommended that the doctor should determine the prime type of infectious agent and its susceptibility response before prescription of any antibiotic. It will help to cure the disease in most effective way. This study confirms that the susceptibility pattern varies from person to person. More over comparison with pervious studies had shown an increase in resistance against various antibiotics. It is suggested that these kinds of studies should be conducted on the large scale to determine the susceptibility of antibiotics against each kind of infection at national level.

CHAPTER 1: INTRODUCTION

1.1 Infection

Infection is a malfunctioning of body function due to attack of microorganism and its multiplication inside host. These organisms react with the host tissues; as a result of this infection the organism or body organ are affected. Infection is transferred through the microorganisms which are main disease causing agents. Virus, Bacteria and fungi are most common Infection causing agents (Signore and Glaudemans, 2011). Our body is equipped with a natural mechanism which tries to kill these invaders and guard the body from infection. This defense system is our immune system. When our immune system is unable to stop or remove these infectious agents from multiplication in body infections are produced and the organism got a disease. Based on the type and degree of disease particular medications are recommended e.g Antibiotics, Antiviral, Antifungal drugs for the treatment and cure of the infections (Umeh and Berkowitz, 2009).