

**ISOLATION AND CHARACTERIZATION OF *Escherichia coli*
FROM DRINKING WATER OF KATHMANDU WITH RESPECT TO
ANTIBIOTIC SUSCEPTIBILITY AND HEAVY METALS RESISTANCE
PATTERN**

**A DISSERTATION
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**BY
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RECOMMENDATION

This is to certify that **Ms. Geeta Pandey** has completed this dissertation work entitled **“ISOLATION AND CHARACTERIZATION OF *Escherichia coli* FROM DRINKING WATER OF KATHMANDU WITH RESPECT TO ANTIBIOTIC SUSCEPTIBILITY AND HEAVY METALS RESISTANCE PATTERN”** as a partial fulfillment of M.Sc. Degree in Microbiology under my supervision. To my knowledge this thesis work has not been submitted for any other degree.

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ABSTRACT

Water deficit and deteriorating of water quality in Kathmandu is of great concern. The pollution of drinking water is responsible for a large number of mortalities and morbidities due to water-borne diseases. A study was carried out to evaluate the quality of drinking water of Kathmandu valley, was conducted from August 2008 to March 2009 in the laboratory of Central Department of Microbiology, Kirtipur. A total of 102 tap water samples were randomly collected from different areas of Kathmandu. These samples were analysed for physicochemical and microbiological parameters to assess the drinking water quality. *E. coli* isolated from these water samples were subjected to antibiotic susceptibility testing and heavy metals resistance pattern.

The seasonal variation in temperature was observed with the highest and the lowest temperature being 25.7⁰C and 11.8⁰C respectively. No variation was seen in the pH values of the water samples with all the values lying within the WHO recommended limit (6.5-8.5).

Out of 102 water samples 86.2% and 19.6% of the samples were found to contain total coliform and thermotolerant coliform respectively beyond the guideline value as recommended by the WHO (0 CFU/100 ml). A total of 20 *E. coli* isolates were obtained. Antibiotic susceptibility testing revealed resistance of *E. coli* isolates mainly towards Cephalexin (65%) followed by Amoxicillin (45%) and Tetracycline (15%). All the isolates were 100% sensitive to Co-trimoxazole, Amikacin, Chloramphenicol, Ceftriaxone, Ciprofloxacin, Nalidixic Acid and Gentamicin. The study of heavy metals resistance pattern revealed that 66.6% of *E. coli* isolates that exhibited resistance to more than one antibiotics had high MIC values for a set of heavy metals. All isolates exhibited high resistance to Zinc with average MIC 679.2 µg/ml and low resistance to Mercury with average MIC 58.3µg/ml.

TABLE OF CONTENTS

	Page No
Title page	
Recommendation	i
Certificate of approval	ii
Board of Examiners	iii
Acknowledgement	iv
Abstract	v
Table of contents	vi
Lists of abbreviations	ix
List of tables	xi
List of photographs	xii
List of appendices	xiii
CHAPTER I	
1 INTRODUCTION	1-3
CHAPTER II	
2 OBJECTIVES	4
2.1 General objectives	4
2.2 Specific objectives	4
CHAPTER III	
3 LITERATURE REVIEW	5-40
3.1 Water pollution	5
3.2 Sources of water pollution	6
3.3 Effects of water pollution	6
3.4 Water supply system of Kathmandu valley	7
3.5 Outbreak of waterborne diseases in Nepal	8
3.6 Physicochemical parameters of water	10
3.6.1 Temperature	10
3.6.2 pH	11
3.7 Water purification	12
3.8 Microbial indicators of water quality	12
3.8.1 Coliform bacteria	12
3.8.2 Thermotolerant coliform bacteria	13
3.8.3 Faecal streptococci	13
3.8.4 <i>Clostridium perfringens</i>	13
3.8.5 <i>Escherichia coli</i>	14
3.8.6 Other members of coliform group	16

3.8.7 Other common waterborne pathogens	17
3.9 Study of physicochemical quality of water in Nepal	19
3.10 Study of microbial quality of water in Nepal	21
3.11 Antibiotics and bacterial resistance to antibiotics	27
3.12 Studies on bacterial resistance to antibiotics	28
3.13 Heavy metals and their effects on microorganisms	33
3.14 Health effects of heavy metals	34
3.15 Microbial resistance to heavy metals	36
3.16 Studies on microbial resistance to heavy metals	38
CHAPTER IV	
4 MATERIALS AND METHOD	41-45
4.1 Materials	41
4.2 Methods	41
4.2.1 Study area	35
4.2.2 Collection of water samples	35
4.2.3 Transportation and preservation of sample	41
4.2.4 Physicochemical parameters of samples	42
4.2.5 Total coliform and thermotolerant coliform count	43
4.2.6 Isolation and identification of <i>E. coli</i>	43
4.2.7 Study of antibiotic susceptibility of <i>E. coli</i> isolates	44
4.2.7.1 Preparation of swab	44
4.2.7.2 Preparation of barium sulphate standard	44
4.2.8 Study of heavy metals resistance of <i>E. coli</i> isolates	45
CHAPTER V	
5 RESULTS	46-54
5.1 Physico-chemical parameters of water	46
5.1.1 Temperature	46
5.1.2 pH	46
5.2 Bacteriological quality of water	47
5.2.1 Total coliform count and thermotolerant coliform count	47
5.2.2 Isolation and identification of <i>E. coli</i>	49
5.3 Antibiotic susceptibility pattern of <i>E. coli</i> isolates	50

5.4 Minimum inhibitory concentration of heavy metals to <i>E. coli</i> isolates	52
CHAPTER VI	
6 DISCUSSION AND CONCLUSION	54-62
6.1 Discussion	54
6.2 Conclusion	61
CHAPTER VII	
7 SUMMARY AND RECOMMENDATION	63-64
7.1 Summary	63
7.2 Recommendations	64
REFERENCES	65-76
APPENDICES	I-XXV

LIST OF TABLES

		Page No
Table 4.1	Biochemical tests performed for identification of <i>E. coli</i> isolates	38
Table 5.1	Location wise result for physico-chemical parameters	42
Table 5.2	Total coliform count exceeding WHO guideline value	43
Table 5.3	Location wise total coliform count exceeding WHO guideline value	43
Table 5.4	Thermotolerant coliform count exceeding WHO guideline value	43
Table 5.5	Location wise thermotolerant coliform count exceeding WHO Guideline value	44
Table 5.6	Location wise isolation of <i>E. coli</i>	45
Table 5.7	Antibiotic susceptibility pattern of <i>E. coli</i>	46
Table 5.8	Percentage of antibiotic susceptibility of <i>E. coli</i> isolates	47
Table 5.9	Frequency of antibiotic and multiple-antibiotic resistance among <i>E. coli</i>	48
Table 5.10	Minimum Inhibitory Concentration of heavy metals to isolates	55

LIST OF PHOTOGRAPHS

- Photograph 1 Total coliform on M-endo agar
- Photograph 2 Thermotolerant coliform on M-endo agar
- Photograph 3 Biochemical tests of *E. coli*
- Photograph 4 Antibiotic susceptibility pattern of *E. coli*
- Photograph 5 Copper resistant *E.coli* isolated on NA incorporated with 100 microgram/ml copper.
- Photograph 6 Zinc resistant *E. coli* isolated on NA incorporated with 100 microgram/ml zinc
- Photograph 7 Lead resistant *E. coli* isolated on NA incorporated with 100 microgram/ml lead

LIST OF APPENDICES

Appendix I	Lists of materials
Appendix II	Sampling sites and their codes
Appendix III	Physico-chemical analysis of tap water samples
Appendix IV	Bacteriological analysis of tap water samples
Appendix V	Chart for identification of <i>E. coli</i> isolates
Appendix VI	WHO guideline value for bacteriological quality of drinking water
Appendix VII	Zone Size Interpretative Chart of Antibiotic Susceptibility Testing

LIST OF ABBREVIATIONS

APHA	-	American Public Health Association
ATCC	-	American Type Culture Collection
ATPase	-	Adenosine Tri- Phosphatase
ATSDR	-	Agency for Toxic Substances and Disease Registry
BOD	-	Biochemical Oxygen Demand
CBS	-	Central Bureas of Statistics
CdCl ₂	-	Cadmium Chloride
CEDA	-	Centre for Economic Development and Administration
CFU	-	Colony forming unit
Conc	-	Concentrated
CuSO ₄	-	Copper Sulphate
DISVI	-	Italian International Co-operation
DNA	-	Deoxyribonucleic acid
DoHS	-	Development of Health Services
ENPHO	-	Environment and Public Health Organization
HgCl ₂	-	Mercurous Chloride
HMG	-	His Majesty's Government
H ₂ S	-	Hydrogen Sulphide
ICIMOD	-	International Centre for Integrated Mountain Development
IOCC	-	International Office of Cocoa, Chocolate and Sugar Confectionery
JICA	-	Japanese International Co-operation Agency
MHA	-	Mueller Hinton Agar
MIC	-	Minimum Inhibitory Concentration
MF	-	Membrane Filter
Pb(NO ₃)	-	Lead Nitrate
Spp	-	Species
TSI	-	Triple Sugar Iron Agar
UNEP	-	United Nations Environmental Programme
UNICEF	-	United Nations International Children Emergency Fund
USEPA	-	United States Environmental Protection Agency
WHO	-	World Health Organization

w/v	-	Weight by volume
ZnCl ₂	-	Zinc Chloride
μg		Microgram