ISOLATION AND CHARACTERIZATION OF *Escherichia coli* FROM DRINKING WATER OF URBAN KATHMANDU

A DISSERTATION
SUBMITTED TO THE CENTRAL DEPARTMENT OF MICROBIOLOGY
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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF
MASTER OF SCIENCE IN MICROBIOLOGY
(ENVIRONMENT AND PUBLIC HEALTH)

BY
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RECOMMENDATION

This is to certify that **Mr. Saurav Nath Aryal** has completed this dissertation work entitled **"ISOLATION AND CHARACTERIZATION OF *Escherichia coli* FROM DRINKING WATER OF URBAN KATHMANDU**" 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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CERTIFICATE OF APPROVAL

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ABSTRACT

Water borne diseases are among the leading causes of morbidity and mortality in developing countries like Nepal. This study carried out to evaluate the drinking water quality of urban areas of Kathmandu, 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 and oligodynamic testing.

Distinct variation in temperature was observed with the highest and the lowest temperature being 25.7^{O}C and 11.8^{O}C respectively. No variation was seen among the pH values of the water samples with all the values lying within the WHO guideline (6.5-8.5).

Microbial quality analysis revealed 86.2% and 19.6% of the samples to contain total coliform and thermotolerant coliform respectively beyond the WHO guideline (0 CFU/100 ml). A total of 20 *E. coli* isolates were obtained from 20 water samples tested positive for thermotolerant coliform. Antibiotic susceptibility testing revealed resistance of *E. coli* isolates mainly towards Cephalexin(65%) followed by Amoxycillin(45%) and Tetracycline(15%). All the isolates were 100% sensitive to Co-trimoxazole, Amikacin, Chloramphenicol, Ceftriaxone, Ciprofloxacin, Nalidixic Acid and Gentamicin. Study on oligodynamic action revealed silver to be highly effective, copper effective while brass, aluminium and steel totally ineffective in inhibiting the *E. coli* isolates. The average zone of inhibition for silver and copper were 6.4 mm and 4.1mm respectively.

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LIST OF ABBREVIATIONS

APHA	-	American Public Health Association
ATCC	-	American Type Culture Collection
CBS	-	Central Bureas of Statistics
CEDA	-	Centre for Economic Development and Administration
CFU	-	Colony forming unit
Ci	-	Ceftriaxone
Conc	-	Concentrated
DISVI	-	Italian International Co-operation
DNA	-	Deoxyribonucleic acid
DoHS	-	Development of Health Services
ENPHO	-	Environment and Public Health Organization
EU	-	European Union
G + C	-	Guanine plus cytosine
GI	-	Gastrointestinal
Gm +ve	-	Gram positive
Gm –ve	-	Gram negative
HMG	-	His Majesty's Government
H_2S	-	Hydrogen Sulphide
JICA	-	Japanese International Co-operation Agency
KMC	-	Kathmandu Metropolitan City
LT	-	Heat labile
MA	-	MacConkey Agar
MAR	-	Multiple Antibiotic Resistant
mcg	-	Microgram
MF	-	Membrane Filter
mg/l	-	Milligram per litre

MHA	-	Mueller Hinton Agar
MLD	-	Million liters per day
ml	-	Milliliter
MR	-	Methyl Red
NA	-	Nutrient Agar
NCCLS	-	National Committee for Clinical Laboratory Standards
NHMRC	-	National Health and Medical Research Council
NHRC	-	Nepal Health Research Council
NPC	-	National Planning Commission
NWSC	-	Nepal Water Supply Corporation
SMEWW	-	Standard Method for the Examination of Water and Wastewater
SODIS	-	Solar Disinfection of Water
ST	-	Heat stable
T	-	Tetracycline
TSI	-	Triple Sugar Iron Agar
UNEP	-	United Nations Environmental Programme
USEPA	-	United States Environmental Protection Agency
UTI	-	Urinary tract infection
VP	-	Voges Proskauer
WHO	-	World Health Organization
w/v	-	Weight by volume
ZOI	-	Zone of Inhibition
µg		Microgram

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