

**THE PREVALENCE OF PATHOGENIC *E. coli* STRAINS
IDENTIFIED FROM DRINKING WATER IN SELECTED
RURAL AREAS OF SOUTH AFRICA AND GABON USING
THE COMPARTMENTAL BAG TEST**

by

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A Dissertation Submitted in Fulfillment of the Requirement for the Degree of
Masters of Science in Microbiology (MSc MBY)

to the

**DEPARTMENT OF MICROBIOLOGY
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UNIVERSITY OF VENDA
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April 2016

ABSTRACT

Introduction: Due to unsafe water, poor sanitation and hygiene practices, drinking water is a major source of microbial pathogens in developing countries particularly in sub-Saharan Africa. Microorganisms present in drinking water pose a major risk to human health. *Escherichia coli* (*E. coli*) counts are used worldwide as indicators of faecal pollution of drinking water. Amongst enteric pathogens, diarrhoeagenic *Escherichia coli* (DEC) strains are important agents of endemic and epidemic diarrhoea worldwide. Several tests are used for detection and quantifying *E. coli* and other faecal bacteria in drinking water; however, the majority are expensive, complex and technically demanding. The Compartmental Bag Test (CBT) is a new, inexpensive, easy to use method that has been developed to overcome those limitations. The aim of the study was therefore to determine the prevalence of pathogenic *E. coli* strains in drinking water in selected rural areas of South Africa and Gabon using the Compartmental Bag Test.

Method: A total of 260 and 73 water samples was collected from various water sources in rural areas of South Africa (Vhembe district) and Gabon (Lambaréné district) respectively and assessed for microbiologically quality using the Compartmental Bag test and standardized m-PCR protocol was used to identify pathogenic *E. coli* strains in the positive samples.

Results: A total of 129 (95 in South Africa and 34 in Gabon) samples were positive for *E. coli* using CBT method. In water samples from South Africa, 36 (38%) of the positive *E. coli* samples tested positive for Commensal *E. coli* strain (*mdh*), 24 (25%) samples tested positive for the atypical EPEC, 11 samples (12%) tested positive for Typical EPEC (*bfp*), 27 samples (28%) tested positive for EHEC (*stx1, stx2*), 34 samples (36%) tested positive for ETEC (*it and st*), 22 samples (23%) tested positive for EAEC (*eagg*) and 9 (10%) samples tested positive for EIEC (*ial*).

In Gabon water samples, 18 (53%) of the positive *E. coli* samples tested positive for commensal *E. coli* strain (*mdh*), 3 (9%) samples tested positive for both Atypical and Typical EPEC (*bfp*), 2 (6%) samples tested positive for EHEC (*stx1 and stx2*), 5 (15%) tested positive for ETEC (*It and st*) and 7 (21%) samples tested positive for EAEC (*eagg*). The results showed that even water sources that are classified as improved sources by WHO/UNICEF, (2015) had *E. coli* counts.

The occurrence of the pathogenic *E. coli* types in water samples could be a risk for diarrhoeal outbreaks in the communities relying on these waters sources.

Conclusion: The Compartmental bag test together with the Multiplex polymerase chain protocol proved adequate for detecting pathogenic *E. coli* strains in water samples.

Key words: Drinking water, *Escherichia coli*, Compartmental bag test