IDENTIFYING HARMFUL MICROORGANISMS IN WATER BY MULTIPLEX POLYMERASE CHAIN REACTION (mPCR)

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INTRODUCTION

- Water is a vital natural resource because of its basic role to life.
- Poor access to safe water and inadequate sanitation continues to be a danger to human health is resouced limited settings.
- In Africa, more than 300 million out of the 800 million people who live on the continent are in water-scarce environments.
- Inadequate sanitation, faecal contaminations of environmental waters by enteric pathogens are very common in Africa.
- Microbial pathogens in water include viruses, bacteria, and protozoa.
- Pathogenic bacteria which include Salmonella sp, Shigella sp, Pseudomonas aeruginosa, Eterohaemorrhagic Escherichia (EHEC) and **Vibrio parahaemolyticus** have been identified as the major etiological agent in the majority of the waterborne outbreaks worldwide.
- Multiplex polymerase chain reaction (PCR) is a variant of PCR in which two or more loci are simultaneously amplified in the same reaction.

Applications of mPCR

a. Mutation analysis
b. Gene deletion analysis
c. Pathogen detection
d. Gene expression analysis
e. GMO detection

Research Problem

- Microbial water-borne diseases seriously affect developing countries and are major water quality concerns throughout the world.
- The water quality in rural Zimbabwe has been impaired mainly due to the contamination of water sources with pathogenic microorganisms from humans and animals.
- The spread of these microorganisms has been enhanced by the fact that animals and humans are sharing the same water sources since most of them are open.
- In Matsika most of the water sources are open causing outbreaks of diarrhoea hence there is need to use multiplex polymerase chain reaction to detect pathogenic microorganisms in water .

Panel 1: Administation of questainnaires

Panel 2: Sample Collection

HYPOTHESIS:

NULL HYPOTHESISH : Mutliplex PCR will not be able to determine pathogenic bacteria in water

ALTERNATIVE HYPOTHESIS : Multiplex PCR will be able to rapidly detect water pathogens hence useful in reducing the burden of diarrhoerial diseases in the Matsika area.

Objectives

1. To map water sources used for public consumption and collect samples in the Matsika area
2. To set up a multiplex PCR method for the the simultaneous detection of five water borne pathogens (Salmonella sp, Shigella sp, *Pseudomonas aeruginosa*, Eterohaemorrhagic Escherichia and Vibrio.
3. To test 19 water sources for the presence of any of the 5 pathogens

Materials and Methods

- Questionnaires were administered to identify sources of water for common household use.
- Water Samples were collected from identified water sources using aseptic water sampling techniques.

Results

- **Consent to administer the questionnaire and collect samples was obtained from the village heads of 5 villages in the Matsika area**
- **A total of 19 Samples where collected from the 5 Villages**

VILLAGE	TYPE OF WATER SOURCES
Chikoki	1. Spring X2 2. Deep Well X 2 3. Shallow Well
Matsika	1. Borehole X 4
Mudyarabikwa	1. Spring 2. Shallow Well 3. Borehole
Mutambirwa	1. Spring 2. Shallow Well X 2 3. Deep Well
Taaguta	1. Borehole 2. Shallow Well X 2

DISCUSSION

During the first phase of our study, the water sources used for domestic applications were identified and samples collected for the microbial analysis. The next first of the study is the optimization of the multiplex PCR assay and the testing of the samples to idientify any microbial contamination. This information will help in the development of water treatment guidelines for the community so as to maintain a health community free of preventable water borne diseases.

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