OCCURENCES OF *Salmonella typhi* IN DRINKING WATER SOURCES AS A RISK FACTOR OF TYPHOID FEVER OUTBREAK IN THE COMMUNITY OF PAYA SUBCOUNTY, TORORO-UGANDA

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DECLARATION

This thesis is my original work and has not been submitted for a degree or any other award elsewhere.

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ABSTRACT

Typhoid fever is a major cause of human mortality throughout large areas of the world. Human typhoid occurs following the ingestion of the Salmonella typhi bacteria, mostly found in contaminated water, animal products or close association with an infected individual. This study investigated the bacterial load of the water samples, and identified of Salmonella typhi bacteria isolated from different drinking water sources in Paya Sub County. Sampling and collection of the water samples took three weeks with one sampling per week. Aseptically, 100 ml of each of the samples of river and borehole, well, and tap water were collected from different sources and sites in Paya sub county. 5 petri dishes of XLD (xylose lysine deoxycholate) Agar were inoculated with each water sample by streak method at 37^{o}C for 24hrs.Colonies on nutrient agar were counted using colony counter technique and the plates having colonies were recorded. Pure cultures of salmonella were made on TSA (tryptic soy agar) which were then gram stained before microscopy. Clear red rod-shaped colonies with black centers, gram –negative rods clustered together (staphylobaccilli) were observed in the microscope. Analysis of variance (ANOVA) at 5% confidence level was used to compare all numeric analysis for the total plate count were made using the F-parametric test where statistical significance existed between the observed two data sets . The null hypothesis was therefore rejected; and alternative hypothesis accepted. Therefore, the stream and pond water sources contained significant bacterial loads that were responsible for the persistent typhoid fever outbreaks in Paya community. Conclusively, the natives were advised to improve on their personal and environmental hygiene, boil water for drinking, emphasize regular hand washing, eating hot food and ensure proper human waste disposal. However, more research needs to be done to explore further on the water quality in relation to typhoid fever, multi-drug resistance of salmonella in many typhoid patients and the cause of this drug resistance.

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LISTS OF ABBREVIATIONS

ANOVA: Analysis of variance

TSA: Tryptic soy agar

XLD: Xylose lysine deoxycholate

CFU: Colony forming units

S.typhi: *Salmonella typhi*

WHO: World Health Organization

MoH: Ministry of Health

DF: Degrees of Freedom

Ho: Null hypothesis

Ha: Alternative hypothesis

UNICEF: United Nations International Children Emergency Fund

CHAPTER ONE:

INTRODUCTION

1.1 Background.

Typhoid fever is caused by ingestion of food or contaminated water with *Salmonella typhi*. Symptoms include high fever. Malaise, headache, abdominal pain, and constipation or diarrhea, and lead to sensitive intestinal destruction and death if untreated. Symptoms begin 1-6 weeks after exposure. Lack of improved sanitation and access to safe food and water among populations living and middle income countries is related to an elevated risk of typhoid fever.

Nearly 12 million cases and 130,000 deaths were estimated to have occurred worldwide in 2010. After adjusting for water-related risk factors (i.e. access to improved water), high incidence of typhoid fever has been reported in 45 African countries, and there has been an increase in the number of reported outbreaks throughout the African continent over the last 10 years.(Salaria, 2018)

Paya sub-county is in West Budama central constituency Tororo district found in Eastern Uganda is among the areas where typhoid fever has been endemic. It is somewhat densely populated with over 5,000 people. In early 2019, the typhoid fever outbreak began in the town council slums of Paya town council and subsequently spread throughout the sub-county and adjacent sub-counties in the district. The attack was higher in males (110/1000) than in females (84/1000) residents and higher in adults 15-59 than in children under 15 (20/1000) residents.

In response to water borne disease outbreak, public health officials often conduct an investigation to define the scope and potential causes of outbreak and inform implementation of effective control measures to reduce the disease burden. Despite the high incidence of typhoid fever globally, relatively few outbreak investigations incorporate drinking water testing and routine water testing for typhi is rarely done in regions where S. typhi is endemic. While these studies have provided useful information, more comprehensive sampling and testing strategies are needed to identify disease transmission risks and areas of focus for public health interventions.

The objective of this study is to determine the salmonella typhi in different drinking water sources in Paya Sub County in order to identify water sources that may have been contributing to the outbreak.

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