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Bacteriological analysis of water from various sources in Iree Town of Boripe Local Government Area, Osun State, Nigeria.

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ABSTRACT
Water is a natural resource and a basic needs of every living creatures, a polar solvent that dissolves many substances, and virtually, the physiological activities of humans and micro organism cannot hold without water. Qualities of water are threatening through pollution, which lead to serious public health concern. However, this study aimed at analyzing water from various sources in Iree town of Boripe Local Government Area of Osun State, Nigeria. The water of various sources were collected in this area, from storage tank, ringed well, unringed well and stream. During this study, coliform determination was conducted through most probable Number Technique, also total bacterial count was done using spread plate count method.The morphological characterization and biochemical tests of the isolates were carried out. The total coliform count was highest in the stream water and the value obtained was 150MPN/100ml of water sample and it was least in ringed well (3MPN/100ml) In the storage water and ringed water samples, the values ranged from 11-15MPN/100ml where storage water sample has 11MPN/100ml. the bacterial counts was low in ringed well water sample, followed unringed well water and storage tank water (1.8 X 10^3, .4 X 10^3 X 10^3 cfulml. The bacterial identify in this study were Enterbacterspp, klebsiella spp, Eschericha coli, Protens spp and Streptococcus Spp. With results obtained above, it showed that all the water samples did not meet the standard onto which water could be according to World Health Organization Standard for potable water. Therefore, attention is needed greatly and immediately in Iree community to safe people from water borne diseases and thus, the water sources call for, treatment since the people solely depend on these water sources for daily uses.

KEYWORDS: ***Watersources, Contaminant, Total Coliform count***

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I. INTRODUCTION

Water covers more than 70% of the earth surface but less than 33% of this availableas fresh water. The amount of fresh water available for human consumption is only about 0.01%, the remaining bound in glaciers and ice (Ahmed *et al.*, 2014). This available small proportion of the earth's total water is becoming increasingly polluted due to various anthropogenesis activity like indiscriminate disposal of municipal and industrial wastes and large scale applications of chemicals in agriculture. Anthropogenic activities introduce harmful substances to the water which results in wide spread water-linked diseases (Soomro, *et al;* 2011).

The United nations identified improving water quality as one of the Eight million Development Goals (MCDs). Its target is to reduce the number of people without access to safe drinking water by 50% by 2015 (WHO, 2011).

Water Borne disease including diarrhea and gastro intestinal illness are caused by various bacteria, fungi, viruses and protozoa (Grown *et al;* 2006). In developing countries, such as Africa, Water borne diseases affect millions (Fenwick, 2006).

According to WHO, 3.4 million people, mostly children die of water related diseases (WHO, 2014). The quality of water varies from place to place and source to source, sometimes depending on seasonal changes. Also, the type of soil, rocks, surfaces, through which the water moves, human activities in and around the water area determines the quality of water. (water Quality information, 2020).

Naturally occurring contaminants are present in the rock and sediments, as water flows through the sediments, metals such as iron and manganese may be dissolved and may later be found in higher concentrations in water (water quality Information, 2020).

II. METHODOLOGY

Collection of water sample.

Water samples used in this study were collected from different locations in Iree town and the sources Include; storage tank water, Ringed well water, unringed well water and stream water, the water sample were collected into sterile glass vessels, capped and immediately taken to microbiology laboratory of Osun State Polytechnic, Iree for analysis (WHO, 1997).

Total Coliform Count

This was conducted through multiple fermentation tube (MT) method.Series of tubes containing 10ml/double strength MacConkey broth with durham tubes inserted and inverted which had already inoculated with 10ml of the water samples each. Also, two set of three test tubes containing 10ml single strength MacConkey broth with durham tubes inserted and inverted were inoculated with 1ml and 0.1ml each of test water samples respectively. Every inoculated tubes was incubated for 24-48 hours for acids and gas production for presumptive positive text (APHA, 2002). (Fawole and Oso, 2004). The positive tubes indicate presence of coliform. The probable numbers of coliform colonies present in the water samples was estimated using Maccrady statistical table. The positive tubes obtained through presumptive test were inoculated in Eosine Methyline Blue (EMB) Agar (confirmatory test) to observed for greenish metallic sheen to confirm the presence of *Escherichia coli* (Fawole and Oso, 2004). The positive colonies shown on the EMB agar were inoculated on a tube of lactose both alongside with durham tubes inverted, and incubated at 37^0C for 24-48 hours (completed test). Gas production after incubation confirms the presence of coliform.

Total Viable bacterialcount

Spread plate method was used (APHA, 1985). Each water sample was diluted serially within dilution factors 10^{-1} - 10^{-5}0.5ml was taken from Dilute factor 10^{-3} was plated on nutrient agar medium and incubated at 37^0C for 24-48hours. After incubation, the plates were examined for colony formation and the numbers of discrete colonies were counted and expressed in cfu/ml (Adebowale *et la:* 2010)

Characterization and identification of isolates.

The characterization of the bacterial isolates was done by the determination of the characteristics of colonies on the plate, cellular morphology and biochemical characteristics, the identification of the isolates was obtained (Burchanan and Gibbons, 2004).

III. Results.

The total coliform count is shown in the below table I

Table 1: Most Propable Number (MPN) of bacterial isolates from the water Sample (Mean Most Probable).

Sample Code	Double Strength (10ml)	Single Strength (1ml)	Single Strength (0.1ml)	MPN/100ml.
WFSR	1	0	3	15
WFRN	0	0	1	3
WFURW	1	0	2	11
WFST	3	2	1	15

Key: WFSR = Water from storage tank, WFRW= Water from ringed well, WFURW= Water from unringed well, WFST= Water from Stream.

Table 2: Total Bacterial Counts from analysed water samples

Sample Code	Colony forming Unit (Cfu/ml)
WFSR	42×10^3
WFRN	1.8×10^3
WFURW	2.4×10^3
WFST	7.2×10^3

Key: WFSR = Water from storage tank, WFRW= Water from ringed well, WFURW= Water from unringed well, WFST= Water from Stream.

Table 3: Colonisl, Morphological and Biochemical Characterization of isolates from water samples

isolates[1] Charaterization	BI_1	BI_2	BI_3	BI_4	BI_5
Colour	Creamy	Creamy	White	Creamy	Creamy
Elevation	Slightly	Raised	Flat	Raised	Raised
Shape	Rod	Rod	Rod	Rod	Rod
Edge	Smooth	Rough	Smooth	Rough	Smooth

Arrangements of Cell	Cluster	Cluster	Single	Single	Chain
Aram reaction	Negative	Negative	Negative	Negative	Positive
Spore reaction	Negative	Negative	Negative	Negative	Negative
Capsule reaction	Negative	Negative	Negative	Negative	Positive
Catalase reaction	Positive	Positive	Positive	Positive	Negative
Coagulase reaction	Negative	Positive	Positive	Positive	Negative
Nitrate test	Positive	Positive	Positive	Positive	Positive
Mrvp test	Positive/ nagative	Positive/ nagative	Positive/ negative	Positive/ nagative	Positive/ nagative

Key: WFSR = Water from storage tank, WFRW= Water from ringed well, WFURW= Water from unringed well, WFST= Water from Stream.

IV. Discussion

The bacteria identified in the water samples were known to be pathogenic and this indicates that their occurrence in water may pose serious threats and harms to the people consuming the water in this area.

The total coliform in the water samples were studied also the viable bacteria count and the characterization of the isolates were done. The total coliform count obtained from the various water samples collected ranged between (3-150)/100ml. The ringed well water has the least value, while the stream water sample has the highest (3per100ml and 150per 100ml respectively). The valued obtained above has exceeded the recommended limit of 1cfu/100ml by WHO (1996). The presence of the coliform in the stream water in high value will pose health risk for human consumption and use (Kolawole *et al;* 2011).

The total Viable bacteria count in the water samples ranged between (1.8 -7.2 X 10^3) cfu/ml.The highest value of 7.2 X 10^3 cfu/ml obtained in stream water sample was higher than the recommend value by WHO (1996) which was 1.0 X 10^2 cfu/ml for domestic water use.

The bacteria isolated in this study were identified to include: *Enterobacter* Spp, *Klebsiella* Spp, *Escherichia Coli,Protens* Spp and *Streptococcus* spp. Majority of the bacteria confirmedin this study are responsible for gastro intestinal disorder, diarrhea, dysentery, Urinary trait infections especially when the water from thesesources are consumed raw by humans this result is also in line with the finding of Kosek *et al.,*(2003) who reported that diarrhea diseases caused by this bacteria in water has a global burden to every human health when consumed.

Moreover most of the identified bacteria in this study were from sewage and soil origin (Wilson and Miles, 2015). For instance *Klebsiella* spp and *E.coli*identified from the water sample are coliform group of bacteria and this shows that the water samples were polluted greatly especially the stream water that has the highest value with faecal matter, Streptococcus spp and Proteus spp are of soil origin.

The presence of *E.coli* and *Enteroccus* spp in the water samples analysed also agree with the findings of Wilkes *et al* (2009) who reported a comparative study on the presence and concentration of several pathogenic and indicator bacteria in the surface water of a Canadian river where they reported*E.coli, Enterococcus,* spp and *Clostridium*perfringes as well.

Finally it is better to call the attention of the government to this area for proper treatment of these water sources so that the people living in this area could free from endemic diseases which may result from water pollutants and it could be deduced that all the water sources analysed contained contaminants and measures are needed immediately to correct or reduced the level of contaminant in it.

V. Conclusion

It is concluded from this study that various sources of water for human uses and consumption which have been analysed indicated that people in this area must desist from making used of this water until proper treatment and habits of people towards the usage are corrected. Also, the presence of coliforms and pathogenic bacteria would also pose health risks if people continue to use the water. Hence, the water of various sources are not potable.

VI. Recommendation

i. Effort must be made by the government to see the way people in this country make use of water sources (activities toward the usage of the water) and must be checked.

ii. The government, local andstate levels should endeavour to provide safe water for the community.

iii. The dumping of sewage and refuse to water bodies should be discouraged

iv. The entire community should be educated and enlightened through government agency on how to maintained proper hygiene on water sources.

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