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Research Paper

Microbiological Examination of Ubu Stream Water in Ukpo Town, Anambra State

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ABSTRACT:- The study was on the microbiological examination of stream water in Nnewi South Local Government Area of Anambra State. The water samples were aseptically collected from three different locations-drinking, washing and swimming/bathing with sterile sample bottles. The samples were taken to the laboratory and analyzed immediately using standard microbiological and biochemical methods. The total viable count in sample A ranged from 6.5 x 10^5 cfu/ml to 1.8 x 10^5 cfu/ml). The range for sample B was 6.0 x 10^5 cfu/ml to 8.0 x 10^6 cfu/ml and that of sample C was 1.2 x 105 cfu/ml to 3.0 x 10^6 cfu/ml. Bacteria isolated include *salmonella* spp, *Escherichia coli klebsiella spp* and *Enterobacter spp***.** The fungi isolated was mainly *Candida* spp. It was the concluded that the stream is of poor microbiological quality and not safe for drinking except otherwise purified and not sterilized before drinking.

I. INTRODUCTION

Natural waters are relatively dilute aqueous solutions (Obire *et al.*, 2003). Pollution of the aquatic environment has been defined by WHO/UNESCO as an introduction by human, directly or indirectly of substances or energy into the marine environment which results in such deleterious effects as harm to the living resources, hazards to human health, hindrance to marine activities including fishing and impairment of quality for the use of the water.

Water quality can be assessed using a number of lines of investigation such as chemical, biological and bacteriological methods (Itodgkiss, 1998).
Almost all water used by human being is returned as waste water and require proper disposal to prevent it from reaching and contaminating water resources. In most cases, it is not practicable as a result of lack of technical know how (Asupuo, 1989).

Pollution of water bodies (rivers, lakes, pond and streams) by nutrients is mostly experienced as a result of industrial discharge, municipal domestic sewage disposal, surface run off from agricultural kinds, under water and salt water intrusion and inundation (Asupuo and Okorie, 1989).
Untreated waste from processing industries are discharged into inland water bodies resulting to discolouration and greasy-oily nature of such water bodies (Mombeshora, 1981).

Microorganisms such as bacteria and parasites found in streams include *Escherichia spp.*, *Entamoeba histolitica***,** *klebsiella spp* and *Shgella spp*. (Brenna, 1993). The various water sources are exposed to contamination with faecally derived organisms and are not usually treated at all or not sufficiently treated to ensure acceptability according to the international guidelines (WHO, 1983). Natural waters are therefore never pure and water being a universal solvent dissolves many chemical substances and also carries in suspension a lot of impurities (WHO, 1998).

Portable water for domestic use should be free from pathogenic microorganisms and toxic substances such as heavy metals and hydrocarbons. In addition should be odourless, colourless and devoid of particulate matter (Emile, 1999). The aim of this study is therefore to ascertain, the microbiological quality of stream water in Nnewi South Local Government Area.

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II. MATERIALS AND METHODS

Three water samples were collected with sterile sample bottles tightly fitted with caps from the stream from three different locations – washing area, drinking area and washing/bathing area. The samples were taken to the laboratory for analysis within 24 hours. The microbial analysis included enumeration and identification of microbiological contaminants as described by Okafor (1999) and Duguid (1984). The plates were inoculated and incubated at 37^0c for 24-48horus on Nutrient agar, MacCorkey agar, *Salmonella Shigella* agar and Sabouraud dextrose agar using pour plate method. The plates that showed discrete colories were counted and then subcultured to obtain pure isolates. The Total Viable Count was then obtained by (TVC = $\frac{N}{VXD}$ where TVC = Total viable count, N = mean colony, D = dilution and V = volume plated. The pure isolates were then characterized by Gram's Staining and Biochemical tests such as indole test, Voges-Proskauer test, MethyRed test, citrate test, catalase tests, coagulase test, oxidase test, motility test and sugar fermentation test. The fungi were also characterized by slide culture method as described by Okafor (1999) and also on the basis of pigmentation and mycelia arrangement. The isolates were confirmed with references to standard bacteriological and mycological manuals.

Further tests such as presumptive test, confirmatory test and completed tests using Eosine Methylene Blue Agar (EMB Agar) were done to differentiate *Esherichia coli* from other Coliforms.

III. RESULTS

The total bacterial count of sample C (collected from drinking point) is lower ($2.0x10^3$ cfu/ml compared to those of washing area 'A' 5.0 x 10^4 cfu/ml and B (Bathing/Swimming area) 4.0 x 10^4 cfu/ml. The result of total viable count is shown in table I.

Sample	**Total Viable count (cfu/ml)**			
	NA	**MCA**	**SDA**	**SSA**
A	**6.5 x 10^3**	**4.0 X 10^3**	**NG**	**5.5 x 10^4**
B	**6.0 x 10^4**	**2.0 x 10^4**	**2.0 x 10^4**	**3.5 x 10^4**
C	**1.2 x 10^5**	**8.0 x 10^5**	**1.0 x 10^4**	**2.2 x 10^4**

Key. NA = nutrient agar, MCA = MacCorkey agar, SDA = Sabouraud dextrose agar, SSA = *Salmonella Sligella* agar, NG = No growth.

Table 2 and 3 show characteristics of bacteria and fungi isolates respectively.

Table 2: Characteristics of Bacterial Isolates

Isolate	Colony morphology	Microscopic morphology	Gram reaction	Catalase	Citrate	Coagulase	Methyl red	Oxidase	Indole	Voges-proskauer	Motility	Lactose	Glucose	Sucrose	Manitol	Maltose	Probable Organism
1	Grayish in colour, circular and moist about 2-3mm in diameter	Rod shaped	-	+	+	-	+	-	-	-	+	AG	AG	A	AG	A	*Salmonella Spp.*
2	Grayish to colourless smoot colonies about 2-3mm in diameter	Rod shaped	-	+	-	-	+	-	+	-	+	AG	AG	AG	G	AG	*Esherichia Coli.*
3	Large, red and mucoid on Macconkey Agar	Rod shaped	-	+	+	-	-	-	-	+	-	AG	AG	AG	AG	G	*Klebsiella Spp.*
4		Rod shaped	-	+	+	-	V	+	-	+	+	V	AG	AG	AG	AG	*Enterobacter Spp*

Key: V = variable, A= Acid, G = Gas, - = negative + = positive

Table 3: Characteristics of fungal isolate

Isolate	Cultural morphology	Microscopic morphology	Probable organism
1	White to cream smooth colonies	Spherical - budding	*Candida Spp*

Table 4: Total Coliform and Faecal Coliform Count

Sample	Total coliform count	Total faecal coliform
A	10	**6**
B	8	**3**
C	2	**1**

Key: A = washing area (b) swimming and Bathing area (c) drinking area.

IV. DISCUSSION

There is high bacterial counts in virtually all the samples. Orazurike *et al.* (2008) revealed that the original source of any dirking water is rich in aquatic microbes, some which would be dangerous if they entered into human body.

The isolation of *E coli, klebsiella spp., Salmonella spp.*, and *Enterobacter spp.* is a clear indication that other pathogenic organisms may also be present. This result compared favourable with the report of Banwo (2006) which indicates that the presence of bushes and shrubs attracts smaller mammals that go to the water bodies to drink water, thereby passing out faeces into the water and this agrees with the findings of Yerima (2008). The faeces make the water to be unfit for human consumption.

The high total coliform count in washing and swimming area is understandable because contaminants could be caused by human. The isolated bacteria species are inline with that isolated from water and aquatic environments by Okonkwo, (2008).

V. CONCLUSIONS AND RECOMMENDATIONS

From the result, it is concluded that microorganisms especially enteric ones present in water renders it unfit for drinking. The negligible number of coliform in drinking area is caused by seasonal pollution of the surface water.

It is therefore recommended that necessary precaution be taken to prevent contamination of any sort. Also routine microbiological analysis should be carried out for the water body in order to control pollution.

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