



## BACTERIOLOGY OF WATER IN RURAL AND URBAN AREAS OF KAKINADA

## Microbiology

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## ABSTRACT

Water is essential constituent for all types of living beings. The quality of drinking water is an important environmental determinant of health. 30 samples collected from both rural and urban areas from various sources were processed by H<sub>2</sub>S Strip Test and Direct Eijkman Test. The unsatisfactory samples were processed further for identification of pathogenic organisms. Among 16 samples collected from rural areas, 50% samples were satisfactory and 50% were unsatisfactory. Among 14 samples collected from urban areas, 42% were satisfactory and 58% were unsatisfactory. Public taps form major source of satisfactory samples in rural areas and unsatisfactory samples in urban areas. If there is proper treatment, the water quality will improve. The protected water supply through public taps needs improvement.

## KEYWORDS

Water analysis, H<sub>2</sub>S Strip Test, Direct Eijkman Test

## INTRODUCTION

Water is essential constituent for all types of living beings. The quality of drinking water is an important environmental determinant of health.

## AIMS AND OBJECTIVES-

- Direct Eijkman test, to reduce the time of reporting and to perform H<sub>2</sub>S Strip method for bacteriological analysis of water.
- To determine the potability of water in rural and urban areas of Kakinada from three sources - public taps, over head tanks, hand pumps

## MATERIAL AND METHODS

30 samples collected from both rural and urban areas from various sources like public taps, overhead tanks, hand pumps are included in the study (Table No. I)

TABLE I- SAMPLE DISTRIBUTION (n=30)

	SOURCE OF COLLECTION	NUMBER OF SAMPLES
RURAL AREA	PUBLIC TAPS	8
	TANKS	4
	HAND PUMPS	4
URBAN AREA	PUBLIC TAPS	7
	OVERHEAD TANKS	4
	HAND PUMPS	3
TOTAL		30

## METHOD OF SAMPLE COLLECTION

Samples are collected in autoclaved plastic bottles of 100ml capacity as per standard procedures. All care is taken to avoid contamination. Bottle is labelled with full details of source, time and date of collection and delivered to laboratory as quickly as possible.

## SAMPLE PROCESSING

- They are processed by modified bacteriological analysis of water by two methods- H<sub>2</sub>S Strip Test and Direct Eijkman Test.
- Direct Eijkman test- Water samples are directly inoculated into single tube of double strength Mac Conkey broth purple and incubated in water bath at 44°C for 24-48 hours without the step of presumptive test. Change of colour to yellow and production of gas is taken as positive.
- H<sub>2</sub>S Strip Test is done as per the laboratory manual of "Disease surveillance at district level" by NICD(National institute of communicable Diseases, New Delhi)<sup>2</sup>
- The water sample is considered as-  
Unsatisfactory -if it is positive by either test.  
Satisfactory- if it is negative by both tests.

TABLE II- COMPARISON OF H<sub>2</sub>S STRIP METHOD AND EIJKMAN TEST-RURAL AREA(n=16)

PUBLIC TAPS (8 SAMPLES)		TANKS (4 SAMPLES)		HAND PUMPS (4 SAMPLES)	
H <sub>2</sub> S	DIRECT EIJKMAN	H <sub>2</sub> S	DIRECT EIJKMAN	H <sub>2</sub> S	DIRECT EIJKMAN
+	+	+	+	+	+
-	-	-	-	-	+
-	-	-	-	-	+
+	+	+	+	+	+
-	-				
-	-				
-	-				
-	-				

TABLE III- COMPARISON OF H<sub>2</sub>S STRIP METHOD AND EIJKMAN TEST- URBAN AREA(n=14)

PUBLIC TAPS (7 SAMPLES)		OVER HEAD TANKS (4 SAMPLES)		HAND PUMPS (3 SAMPLES)	
H <sub>2</sub> S	DIRECT EIJKMAN	H <sub>2</sub> S	DIRECT EIJKMAN	H <sub>2</sub> S	DIRECT EIJKMAN
-	-	+	+	-	-
+	+	-	-	+	+
+	+	-	-	+	+
+	+				
-	+				
+	+				
-	-				

## DISCUSSION

The water sample is considered as-

Unsatisfactory -If it is positive by either test.

Satisfactory- If it is negative by both tests.

- Faecal contamination is confirmed by Eijkman test by detecting faecal Escherichia coli and H<sub>2</sub>S producing organisms are detected by H<sub>2</sub>S Strip method.
- Results show that there could be faecal Escherichia coli without H<sub>2</sub>S producing organisms and vice-versa
- Hence, positive by either method is found to be confirmatory for faecal contamination.
- Among 16 samples collected from rural areas, 50% samples were satisfactory and 50% were unsatisfactory. (Table II)
- Among 14 samples collected from urban areas, 42% were satisfactory and 58% were unsatisfactory. (Table III)
- Public taps form major source of satisfactory samples in rural areas and unsatisfactory samples in urban areas.
- In rural area, hand pumps form most of the unsatisfactory samples and this could be due to their shallowness as water table is high in the coast. Proper maintenance around hand pumps will improve

the potability.

- Protected water supply through public taps in urban area needs improvement.

#### CONCLUSION

- H<sub>2</sub>S Strip test is useful and easy test for detection of faecal contamination of water.
- Direct Eijkman test with single tube saves quantity of media, time for inoculating and reporting.
- Results of the study shows that there could be H<sub>2</sub>S producing coliforms without Escherichia coli and vice-versa.
- Positive by either method is confirmatory for faecal contamination, but negative by single test does not exclude faecal contamination.
- Negative by both test only, is confirmatory for purity of water.
- There is need for proper treatment of water

#### REFERENCES

- 1 Dr.K.R.L.SuryaKirani., MD.,(September 2014). New methodology for bacteriological analysis of potable water, Water Today, The Magazine, Pg 84-88.
- 2 Laboratory manual, "Disease Surveillance at District Level", NICD, New Delhi,(2001).