

# Existence Test Of Escherichia Coli and Pseudomonas Aeruginosa Bacteria in Packaging Drinking Water in Cemani Village, Sukoharjo Regency

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**Abstract**—Clean, potable fresh water is becoming scarce in cities, the river which is the source of it is polluted with various wastes ranging from organic waste, household waste, to industrial waste. The quality of drinking water also affects public health, especially bottled drinking water. One of the parameters for the quality requirements of bottled drinking water is the test for Escherichia coli and Pseudomonas aeruginosa bacteria. The purpose of this study was to identify the contamination of Escherichia coli and Pseudomonas aeruginosa bacteria in bottled drinking water samples, using the MPN (Most Probable Number) method. The research method uses descriptive research. The research population of bottled drinking water in stalls around the Duta Bangsa University Surakarta campus is as many as 7 samples. Collecting data by laboratory observation, data analysis with descriptive analysis. The results of the study were carried out from seven samples of bottled drinking water, all samples were not detected by the Escherichia coli and Pseudomonas aeruginosa bacteria. The conclusion of this study is that there are no Escherichia coli and Pseudomonas aeruginosa bacteria in bottled drinking water sold in stalls around the campus of Universitas Duta Bangsa Surakarta.

**Keywords**—*Escherichia coli*, *Pseudomonas aeruginosa*, *Bottled Drinking Water*

## I. INTRODUCTION

Water is an essential material in life. There is not a single living thing in this world that does not need water. Living cells, for example, whether plants or animals, are mostly composed of water, that is, more than 75% of the contents of a plant cell or more than 67% of the contents of an animal cell are composed of water [6]. Drinking water consists of several types, namely water distributed for household needs, water distributed through water tanks, bottled water, water used for the production of food and beverage ingredients served to the community [2].

Drinking water is water that has been processed or without processing that meets health requirements and can be drunk directly, in accordance with Permenkes RI No. 492 / MENKES / PER / IV / 2010. The ideal drinking water should be clear, colorless, tasteless, and odorless. Drinking water should not contain pathogenic bacteria and all living things

that endanger human health. Does not contain chemicals that can change bodily functions, aesthetically unacceptable, and can be detrimental economically. The water should not be corrosive, leaving no sediment throughout its distribution network. In effect, this goal is made to prevent the occurrence and spread of (water borne disease) [3].

The requirements for each drinking water quality standard still need to be determined by 4 (four) aspects, namely: physical, chemical, biological, and radiological requirements. Physical requirements are determined by factors of cloudiness, color, smell, and taste. Chemical requirements are determined by the concentration of chemicals such as arsenic, chlorine, copper, cyanide, iron and so on. Biological requirements are determined by both pathogenic and non-pathogenic microorganisms [7]. The maximum limit of permissible microbial contamination in drinking water quality according to PerMenKes No.492 / Menkes / Per / IV / 2010 based on microbiological quality, namely: Total Escherichia coli bacteria maximum 0 colonies / g (per 100 ml sample) and total Coiliform bacteria maximum 0 colonies / g (per 100 ml sample).

Escherichia Coli bacteria is a parameter of whether or not the presence of faecal material in a habitat is required for the determination of safe water quality. Especially for the Escherichia Coli bacteria, its presence in water or food materials associated with human interests is not expected [5]. Pseudomonas aeruginosa bacteria is a type of bacteria that is spread on the surface of soil and water. Pseudomonas aeruginosa forms round, smooth colonies with a greenish fluorescent color also often produces a bluish, non-fluorescent pigment called pyocyanin [4].

## II. METHOD

The subject of this research is bottled drinking water of various brands circulating around Sukoharjo Regency. This research method is a quantitative method using the MPN technique. Bottled drinking water samples were taken randomly around Sukoharjo Regency. The following are the stages of the research that will be carried out:

### 1. Sampling

Samples were taken in different shops and circulated in Cemani Village, Surakarta City. The samples taken were 7

samples with sample names A, B, C, D, E, F, G. The samples were taken to the Indonusa Polytechnic campus in Surakarta using a bottle container then taken to the microbiology laboratory at the Indonusa Polytechnic campus for research.

## 2. Total calculation of *E. coli* and *Pseudomonas aeruginosa* bacteria

The bottled drinking water sample was then calculated for the total *E. coli* bacteria using the MPN method which consists of:

### presumptive test

Making LB Media (Lactose Broth) for the Preliminary Test, LB Media was weighed as much as 19.5 grams, put it in Erlenmeyer and dissolve it with 750 ml distilled water<sup>9</sup>.

### confirmed test

Making BGLB Media (Brilliant Green Lactose Broth for Confirmation Test, BGLB Media weighing 195 grams, put it in erlenmeyer and dissolve it with 750 ml distilled water<sup>9</sup>.

### completed test

Making EMBA Media and Endo Agar Media In order to complete the test, the EMBA media weighed 17 grams. Enter the EMBA medium into Erlenmeyer and dissolve it with 440 ml of distilled water. Media PSA weigh as much as 8 grams. Enter the endo medium into Erlenmeyer and dissolve it with 440 ml of distilled water<sup>9</sup>.

## 3. Data Analysis

The data analysis technique was carried out by counting the number of *E. coli* and *Pseudomonas aeruginosa* bacteria colonies contained in the bottled drinking water of each sample using the MPN table and compared with the standard regarding the requirements for drinking water quality (microbiological parameters) so that it can be seen samples that are examined for consumption.

## III. RESULT

### 1. Analysis of *E. coli* and *Pseudomonas aeruginosa* in Bottled Mineral Water Circulating in Sukoharjo Regency

The samples in the study were 7 brands of mineral water circulating in Sukoharjo Regency, namely: i) Nestle, ii) Prime, iii) Cleo, iv) Dzakya, v) Kafur, vi) Crystalline, vii) Amidis, Sodft rider who were then given codes A, B, C, D, E, F and G. The seven samples of mineral water were obtained from various stalls and markets in Sukoharjo Regency. The sample was then tested for *E. coli* and *Pseudomonas aeruginosa* using the MPN technique.

The first stage carried out in this study is a preliminary test using lactose broth media which is a medium for detecting the presence of coliform bacteria. Of the seven mineral water samples the results were negative, but continued to the next test to be sure.

Confirmation tests are carried out to confirm that the sample is true or does not contain coliform bacteria (*Esterechia coli* and *Pseudomonas aeruginosa*) using Brilliant Green Lactosa Broth (BGLB) media.



Figure 1 Results on the Preliminary Test LB media tube



Figure 2 Negative Results on BGLBB Media Tubes of Confirmation Test

The complete test is used to determine the samples that are confirmed positive and indicated as *Escherichia coli* and *Pseudomonas aeruginosa*. However, this complete test was carried out to further confirm the negative results of the preliminary test and confirmation test, using selective media for *Escherichia coli* bacteria, namely EMBA media and selective media for *Pseudomonas aeruginosa* bacteria, namely PSA media. Complete test using EMBA media and PSA media which are differential selective media to detect the presence of *Escherichia coli* and *Pseudomonas aeruginosa* bacteria, their presence is indicated by bacterial colonies of dark or metallic green color [1].



Figure 3 Negative results on petri dishes with selective media PSA and EMBA

Based on 7 samples of bottled drinking water tested, all samples met the microbiological requirements of coliform bacteria as stipulated in the Regulation of the Minister of Health of the Republic of Indonesia No. 492 / MENKES / Per / IV / 2010, namely the maximum level of 0 coliform bacteria per 100 ml of water.

#### IV. CONCLUSION

Based on the results of research samples of bottled drinking water circulating in Cemani Village, Sukoharjo Regency, it can be concluded as follows:

The seven samples have the same MPN index value, namely <3 colonies / ml, thus meeting the requirements according to the Indonesian National Standard (SNI) N0.7388 of 2009 concerning the maximum limit of microbial contamination in bottled drinking water with the MPN index value (Most Probable Number) coliform. namely <3 colonies / 100 and also meets the standards and requirements according to the Indonesian Ministry of Health Regulation Number 492 / MENKES / PER / IV / 2010, namely for E. coli and coliform, every 100 ml of drinking water samples examined is 0 (zero) and the seven samples are not contains Escherichia coli and Pseudomonas aeruginosa bacteria, so the sample is suitable for consumption.

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