

Monitoring Number Of *Colifom* and *Escherichia Coli* on Drinking Water Refill as Pollution Bioindicator

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ABSTRACT

One of the very needed natural resources on our planet is water. A total of 70% of the Earth's surface is water utilized for human development such as drinking, irrigation and cultivating fish. Contaminated water will have a bad effect on all living creatures and their environment^[7]. Sources of water pollution can be derived from manusi stool containing coliform bacteria. The research purposes will be monitoring colifom number and *Escherichia coli* on some samples of drinking water as a bioindicator of drinking water pollution considering the higher the population consuming drinking water refill. This resource is pure resource experiment that use design of resource descriptive analitic. The data obtained will be displayed in the frequency distribution table to see the figure of coliform and *E.coli* in refill drinking water. From the results of this study, of 20 samples of drinking water refill there were 14 unqualified samples where the coliform figures exceeded quality standards. And 5 positive samples of *E. Coli* bacteria.

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Introduction

Water is one of the natural resource natural resources that badly needed by our planet and 70% of earth surface is water that be used for human infrastructure like drinking water, immigration, and fish farming (Bouslah, Djemili, and Houichi 2017) (Appavu et al. 2016). Most of our body fluids come from the water that we drink. We need about 30-60 L clean drinking water that meet the standars of good quality reviewed by the parameter of physic, microbiology, and chemical to fulfill our life necessities. (Sari et al. 2020). One thing that become as a human right now is capable to get clean drinking water (Rahmanian et al. 2015). Explanation of drinking water can be as the water that has been through the processing or without processing that meet standars of

medicine and can be drunk immediately (Kusmawati and Rahayu 2019). One of the main factor that very important to maintain life is safe drinking water right sanitation (Naidoo and Olaniran 2013).

The water that has been contaminated will give bad effect for all the living things and the environment (C Idibie et al. 2018). Sources of water pollution can be came from human feces that contain coliform bacteria (Luby et al. 2015). One of the indicator that be used for measuring water quality from biological indicator is identifying coliform bacteria (Anam, Mahmudati, and Hudha 2016) If the drinking water contains *E. coli* and coliform bacteria, it indicates the bad quality of the drinking water and can causes health problem for people (Palinoan et al. 2019). Coliform is a bacteria that resistance

to water purification naturally (Yustiani et al. 2017). *E. coli* can't be killed by cooling or freezing. This Bacteria can be killed only by antibiotic, Ultraviolet light (UV), or high temperature > 100 °C (Sutiknowati 2016). Resource Tabor et al, in Ethiopia to quality of drinking water shows that 45,7% contaminated coliform (Pakpahan, Picauly, and Mahayasa 2015).

Diarrhea is a disease that happens when the consistence of feces and frequency of defecate change. (Novalino, Suharti, and Amir 2016). Bad quality of water be main factor diarrhea happen (Mikrobiologi 2016). This disease is appear as a result from coliform bacteria and be one of the disease cause death. (Kusuma and Rasyid, Roslaili 1990). But there are other factors that can affect diarrhea like environment condition, people's behavior, people's service, nutrition, population, education that comprise knowledge, and social economy (Ragil and Dyah 2017). Globally, estimation level of the disease and death more than 10 million children aged under 5 years old die every year, about 20% caused by diarrhea infection (Humrah et al. 2018). Besides diarrhea, there are so many dangerous disease inflicted by coliform bacteria such as dysentery, typhus, salmonellosis, listeriosis, parasitic worm infestation, and virus infection (Ahmed et al. 2015).

In this modern era, people like to think practically to get drinking water easily without being troubled to cook it but they get clean water to drink (Khoeriyah and Anies 2015). So that there are so many business place to refill water using gallon for serve people's need. Based on the survey, there are two type of consumers of DAIMU, they are family-consumer and not family-consumer. Family-consumer is the one who buy DAIMU for other necessary, besides from the household needs like education and food (Fasyni and Najib 2015). Refill drinking water depot as an alternative choice to fulfill drinking water's need can be dangerous if the quality of the depot still doubtful, especially when the consume do not pay attention to

safety and hygiene (Telan, Agustina, and Dukabain 2015).

The contamination to refill drinking water can be happened because processing water in the place of production is not effective, or there is recontamination in refill process in DAIMU. (Raksanagara et al. 2018). Moreover, *E. coli* bacteria be affected by DAIMU process that be applied still use the economic Ultraviolet filter, use DAIMU more than 24 hours, and not pay attention to dispenser sanitation (Jacob and Sandjaya 2018). So many resources have proved that contamination of coliform bacteria in refill drinking water that has been done in Kabupaten Ogan Ilir found 13 DAIMU (32.5%) water samples are positive contain coliform bacteria (Trisnaini, Sunarsih, and Septiawati 2018), and a Kelurahan Tarok Dipo Bukit tinggi 50% DAIMU contaminated with coliform bacteria (Ningsih et al. 2018). Besides that, there is also the resource show factor that affected contamination of coliform in drinking water that produced by DAIMU are water sources, filter, pump, operator, or employee hygiene, micro filter, and the facility that doesn't meet the standard yet (Sekarwati and Wulandari 2016).

From the description above, then there will be Monitoring of numbers Coliform and *Escherichia Coli* on some samples of drinking water as bioindicator of drinking water pollution because so many people consume refill drinking water.

Materials and Methods

Design of resource

This resource is pure resource experiment that use design of resource descriptive analitic, which illustrate the numbers of coliform and *Escherichia coli* in refill drinking water.

Samples of Resource

This research sample is refill drinking water that comes from DAIMU at Palembang with the random sampling method

Time and Place of Resource

This Resource held in February at Integrated laboratory Faculty of Science and Technology UIN Raden Fatah Palembang

The procedur for testing contamination of coliform in refill drinking water use the MPN method (Most Probabale Number) follow the standar of SNI 3554 (2006) (Nasional, Ics, and Nasional 2006)(Kusuma and Rasyid, Roslaili 1990). This laboratorium testing use the medium lactose broth, and medium Brillian green lactose broth for confirmative test, refer to the standar method from APHA, which is for revealing numbers of coliform bacteria that use Hopkins table, better known as JPT (Jumlah Perkiraan terdekat). The table can be used to estimate the numbers of koliform bacteria in 100 ml water of sample and complete test by using Media Emba.(Novalino, Suharti, and Amir 2016) And the result that be used is the standar on Permenkes RI No.492/Menkes/PER/IV/2010, that the numbers of the contamination of coliform in drinking water must be 0 (nothing) and doesn't contain E.coli.

The data obtained will be displayed in the frequency distribution table to see the figure of coliform and E.coli in refill drinking water.

Results and Discussion

Tabel 1. Presumptive Test

Sample Number	Number of MPN Tubes (+/-)	Number of Tubes
D1	+++	3
D2	+++	3
D3	+++	3
D4	---	0
D5	---	3
D6	+++	3
D7	+++	3
D8	+++	3
D9	+++	3
D10	+++	3
D11	+++	3
D12	---	0
D13	---	0
D14	---	0
D15	+-	1
D16	+++	3
D17	---	0

D18	++-	2
D19	---	0
D20	---	0

Description:

(+): Formed gas bubbles

(-): Not Formed gas bubbles

Tabel 2 Affirmation Test Result (Confirmative test) BGLB Media Matched with MPN Value

Sample Number	Number of MPN Tubes (+/-)	MPN value	Description
D1	3	3,6	TMS
D2	3	3,6	TMS
D3	-	3,6	TMS
D4	-	0	MS
D5	3	3,6	TMS
D6	3	3,6	TMS
D7	3	3,6	TMS
D8	3	3,6	TMS
D9	3	3,6	TMS
D10	3	3,6	TMS
D11	3	3,6	TMS
D12	-	0	MS
D13	-	0	MS
D14	-	0	MS
D15	0	0	MS
D16	3	3,6	TMS
D17	-	0	TMS
D18	0	0	TMS
D19	-	0	MS
D20	-	0	TMS

Description:

(+): Formed gas bubbles

(-): Not Formed gas bubbles

MS: Meet the Standards (MS)

TMS: Not Meeting Standards (TMS)

Tabel 3. Complete Test

Sample Number	E.Coli	Description
D1	Positive	TMS
D2	Positive	TMS
D3	Negative	MS
D4	Negative	MS
D5	Negative	MS
D6	Positive	TMS
D7	Negative	MS
D8	Negative	MS
D9	Positive	TMS
D10	Negative	MS
D11	Positive	TMS
D12	Negative	MS
D13	Negative	MS
D14	Negative	MS
D15	Negative	MS
D16	Negative	MS

D17	Negative	MS
D18	Negative	MS
D19	Negative	MS
D20	Negative	MS

Description:

(+): Formed gas bubbles

(-): Not Formed gas bubbles

MS: Meet the Standards (MS)

TMS: Not Meeting Standards (TMS)

From the table 1 and 2, it is known that from 20 samples of drinking water refill originating from refill drinking water is only 6 where the value is qualified and 14 other samples are not eligible. And in table 3 shows the results of the complete test to see whether or not the bacteria *E. Coli* on the sample of drinking water and the results showed 5 positive samples containing bacteria *E. Coli*.

Water is a vital need for all living beings on the surface of this earth and the supply of water is very important for the life of the Living creatures (Variation et al. 2015)(Sari et al. 2020). Water can be a natural habitat of many microorganisms whether pathogens or not pathogens with beneficial and pathogenic characteristics and contaminants of pathogenic bacteria in drinking water can cause health problems for the society that consumes The water(Shafi et al. 2013)(Variation et al. 2015). Coliform and *E. Coli* are bacterial contaminants in the pathogenic drinking water. Then the results of the above studies indicate the existence of hazard biological for the user or consume the drinking water because a high Coliform number crosses the threshold allowed.

In the presence of *E Coli* bacteria in the water samples the coliform figures that exceed the normal limit has been indicate that the drinking water has been polluted. Coliform is a type of bacteria Gram-negative, non-spores, motile or non-motile aerob and the factative anaerobic, stem-shaped, and an indicator is to determine the level of fecal pollution in water that can cause disease for human beings (Shariq et al. 2016). *E.coli* is a bacterium that enters the water supply and occurs in fecal contaminants in the case of water pollution. Many diseases caused by

ingestion of contaminants into the water supply

In advanced countries, people usually take drinking water from surface sources such as ponds, wells, streams, city pipes, or water that can be stored in storage tanks where the critical point of contaminants is present in the collection, storage, Or at the time of presentation when you want to use(Packiyam, Kananan, and Pachaiyappan 2016). Similarly, a refill water depot (Damiu) contaminant of these microorganisms can occur from several factors ranging from the condition of sanitary in equipment and labor to the ineligible Damiu or from the raw water used by Damiu Susceptible to bacterial contaminated and raw water-transport processes that typically use tank cars(Print et al. 2020).

In some of the research in the world has proved the fact coliform and *E Coli* both on river water and drinking water. As a study conducted in Pakistan found that about 20% of drinking water sources are polluted coliform due to industrial growth so that the source of drinking water cannot be used anymore (Daud et al. 2017). In addition in the city of Bitung 66.7% DAMIU has a total number of high coliform and 22.2% of which are positive contain bacteria *E. coli* (Kesehatan, Universitas, and Ratulangi 2019).

Conclusion

From the results of this study, of 20 samples of drinking water refill there were 14 unqualified samples where the coliform figures exceeded quality standards and 5 positive samples of *E. Coli* bacteria.

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