



(RESEARCH ARTICLE)



## Description of hygiene sanitation on the existence of *Escherichia coli* bacteria in iced tea drinks at food stalls in Baruga District, Kendari City In 2022

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### Abstract

**Background:** *Escherichia coli* bacteria is an indicator of contamination in beverages. The cause of beverage contamination with *Escherichia coli* bacteria is food handling hygiene that does not meet the sanitary hygiene requirements of the processing area, poor hygiene during handling can cause diarrhea. Based on data from the Lepolepo Health Center UPTD in 2019 there were 219 cases of diarrhea until 2022 from the beginning of January to October there were 142 cases of diarrhea, in this case, cases of diarrhea in health facilities are possible to increase. This study aims to determine sanitary hygiene for the presence of *Escherichia coli* bacteria in iced tea drinks in food stalls in Baruga District, Kendari City in 2022. The research method uses a descriptive observational research type with laboratory analysis. The conclusion in this study regarding the hygiene of the ice tea drink handlers obtained 6 did not meet the requirements and 9 met the requirements, the sanitary hygiene of the processing place obtained 10 met the requirements and 5 did not meet the processing requirements, and the results of laboratory tests obtained 9 negative samples or no bacteria *Escherichia coli* and 6 positive samples contained *Escherichia coli* bacteria. This shows that the application of sanitary hygiene in the processing area, poor handler hygiene, especially in the application of handler hygiene, is one of the causes of bacterial contamination in iced tea drinks.

**Methods:** his type of research is quantitative research with an observational descriptive approach with laboratory analysis to find out a description of sanitary hygiene for the presence of *Escherichia coli* bacteria in iced tea drinks in food stalls in Baruga District, Kendari City in 2022. The sampling technique was random sampling with a total sample size of 15 iced tea drinks.

**Results:** The results on the hygiene variable for handlers of traders in iced tea drinks in food stalls in Baruga sub-district, Kendari city, show that 9 of the food stalls meet the requirements for handler hygiene, while 6 of them do not meet the requirements for handler hygiene. Sanitary hygiene of iced tea processing facilities located in food stalls in Baruga sub-district, Kendari City, shows that 10 food stalls meet the sanitary hygiene requirements for the processing area, while 5 of them do not meet the sanitary hygiene requirements for the processing facility. the results of laboratory tests regarding the presence of *Escherichia coli* bacteria in the iced tea drink, 8 samples were negative or did not contain *Escherichia coli* bacteria, while 7 samples were positive or contained *Escherichia coli* bacteria.

**Conclusion:** in food stalls in the Baruga subdistrict, there were 6 samples contaminated with *Escherichia coli* bacteria with a percentage of 40.0%. hygiene for the handlers of 9 food stalls that did not meet the requirements with a percentage of 60.0% and for the sanitation of processing facilities 5 food stalls did not meet the requirements with a percentage of 33.3%.

**Keywords:** Processing site sanitation hygiene; Handler hygiene; Iced tea drink; *Escherichia coli* bacteria

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## 1. Introduction

Drinks are a very important need in everyday life. In addition to expediting the body's metabolism, drinks are used to quench thirst and to restore the spirit and energy that is drained after doing activities. In its development, water has undergone many changes, whereas previously there was only plain water or plain water without any mixture, now it has experienced the addition of various substances and other natural ingredients. Like iced tea, which is one of the most consumed drinks by consumers (1)

Iced tea is one of the most consumed drinks in the world. In Indonesia, iced tea drinks can be enjoyed by all levels of society, both the upper class and the lower class of the economy. This makes the iced tea drink much more popular with the public. Ice tea is a type of drink made from water, which is brewed with tea, and added sugar and ice. Ice tea drinks are much loved by consumers

because the price is quite cheap, delicious, and easy to get in various places and restaurants (2)

Ice tea is one of the most popular drinks in Indonesia, served in various ways. However, one of the causes of contamination factors that can cause bacteria in iced tea drinks is the addition of ice and water, how to brew the tea, the tools used in the sales environment, the maker, the hygiene and sanitation of the handlers, and the washing of equipment. According to the Regulation of the Minister of Health of the Republic of Indonesia, Number 492/Menkes/IV/2010 concerning drinking water quality requirements the main microbiological parameter that determines the quality of drinking water is the presence of *Escherichia coli* with the maximum level allowed in the regulation being zero. According to the Food and Drug Agency of the Republic of Indonesia, Number HK.00.06.1.52.4011 dated 28 October 2009 for iced tea drinks of the type of microbial contamination for *Escherichia coli* the maximum limit is negative/100ml (4)

The main factors that make iced tea drinkable by bacteria are due to the addition of ice and water, how to brew the tea, the tools used in the sales environment, the maker, the hygiene of the handler's sanitation, and the washing of equipment. This can result in the proliferation of *Escherichia coli* bacteria found in iced tea drinks. *Escherichia coli* found in food and beverages that enter the human body can cause symptoms such as cholera, dysentery, gastroenteritis, and diarrhea.

Diarrhea is the excretion of feces that are soft to liquid in consistency with a frequency of excretion of stool three times or more in one day. Diarrhea can cause fever, abdominal pain, decreased appetite, fatigue, and weight loss. Diarrhea can cause various complications such as loss of body fluids, and hypovolemic shock. The main cause of diarrhea is generally microbes such as *Escherichia coli* which is caused by contaminated food and drink (5)

Data from the Southeast Sulawesi Provincial Health Office in 2018 cases of diarrhea served at health facilities totaled 22,982 cases, in 2019 cases of diarrhea served at health facilities totaled 32,851 cases, and in 2020 cases of diarrhea served at health facilities were 21,246 cases. For the regions with the highest cases of diarrhea, namely in North Kolaka in 2019 cases of diarrhea served at health facilities amounted to 71.38%, in Kolaka with a percentage of diarrhea cases of 66.66% in 2019, Konawe Islands with a percentage of 62, 56% in 2019, Konawe with a percentage of 56.39% in 2019, North Buton with a percentage of diarrhea 53.79% in 2019, South Buton with a percentage of diarrhea cases of 52.96% in 2019, West Muna with percentage of 52.45% in 2019, Buton with a percentage of diarrhea cases of 52.07% in 2019, Kendari City with a percentage of diarrhea cases of 49.46% in 2019, Bau Bau City with a percentage of diarrhea cases of 45.19 % in 2019, Central Buton with a percentage of diarrhea cases of 43.23% in 2019, Wakatobi with a percentage of diarrhea cases of 41.75% in 2019, Bombana with a percentage of diarrhea cases of 36.50% in 2019, Konawe Selatan with a percentage of cases of diarrhea 35.0 0% in 2019, East Kolaka with a percentage of diarrhea cases of 21.28% in 2019, and North Konawe with a percentage of diarrhea cases of 0.00% in 2019 (6)

City Kendari is the capital city of Southeast Sulawesi Province, based on data from the Kendari City Health Office in 2018 the number of diarrhea sufferers served at Kendari City health facilities was 5,559 cases or 49.72%, in 2019 there were 5,123 cases or 25.39% estimate diarrhea served at health facilities, and in 2020 cases of diarrhea have decreased to 2,184 cases or 23.32% and in 2021 the number of diarrhea sufferers served at health facilities in Kendari city is 2,296 cases spread across 16 sub-districts in Kendari City. Estimates of diarrhea served at health facilities spread over 16 sub-districts in Kendari City, including one of them is the UPTD Lepo-Lepo Health Center which ranks 6th and still has the number of cases of diarrhea recorded at the Kendari City Health Office. As well as the number of food stalls in the city of Kendari as many as 114 food stalls spread across 4 villages in the Baruga sub-district (7)

Baruga District is one of the working areas of the Lepo-lepo Health Center UPTD, data from the Lepo-lepo Health Center in 2019 there were 219 cases of diarrhea served at health facilities, in 2020 there were 59 old cases of diarrhea served and new cases of diarrhea served there was an increase with a total of 99 cases of diarrhea served at health facilities, in 2021 the number of sufferers of diarrhea served at health facilities was 109 people, in 2022 from the beginning of January to October there were 142 cases served at health facilities, in this case, diarrhea cases served at health facilities is possible to increase (Puskesmas lepo-lepo, 2020). Baruga Subdistrict resulted in many visitors eating and drinking in this area, so this area has the potential to cause diarrheal disease on a large scale. Diarrhea can occur if the hygiene and sanitation of food and drink in restaurants are not properly observed, causing bacterial contamination, one of which is *Escherichia coli* bacteria.

The results of preliminary observations in the field indicate that the hygiene and sanitation conditions of restaurants in Baruga District sell a variety of foods and beverages and the most frequently consumed by customers is iced tea. From the initial survey of the restaurant, there were still several problems, including a restaurant that did not pay attention to the hygiene of serving drinks, such as talking when serving drinks, not wearing gloves, not wearing an apron, not washing hands when handling drinks and taking drinks, and not wear head protection when serving or administering iced tea. Ice containers that are not covered by food handlers will cause bacteria to be contaminated which can cause diarrheal disease.

## 2. Material and methods

This study used a descriptive observational approach with laboratory analysis to determine the presence of *Escherichia coli* bacteria found in iced tea drinks. This study aims to determine the hygiene of the handlers and the sanitation of the processing facilities for iced tea drinks in food stalls in Baruga District, Kendari City 2022. The location of this research was carried out in Baruga District, Kendari City, and the Kendari City Health Laboratory in January-February 2022. The sample is part of a population that has characteristics similar to the study population. The sampling technique in this study was random, namely a random sampling technique from a population without selecting any criteria. The samples in this study were 15 samples of iced tea drinks.

## 3. Results

### 3.1. Address of the Ice Tea Drinks Restaurant

Table 1. Shows that of the 15 samples of iced tea drink stalls, most of the addresses are in Lepo-Lepo, totaling 10 samples, while the fewest are in the Wundudopi sub-district, which is not in the sample at all, namely 0.

**Table 1** Address Distribution of Ice Tea Drink Food Stalls in Baruga District, Kendari City

No	Address	Amount	
		n	%
1	Baraga	3	20.0
2	Lepo-Lepo	10	86.7
3	Watubangga	2	13.3
4	Wundudopi	0	0
Total		15	100

### 3.2. Gender

**Table 2** Gender Distribution of Respondents in Baruga District, Kendari City

No	gender	Amount	
		n	%
1	Man	3	20.0
2	Woman	12	80.0
Total		15	100

Table 2 shows that there were 15 respondents in this study, namely 12 women and 3 men.

### 3.3. Last Education

**Table 3** Distribution of Respondents' Last Education in Baruga District, Kendari City

No	Last education	Amount	
		N	%
1	SD	3	20.0
2	SMP	3	20.0
3	SMA	6	40.0
4	S1	2	13.3
5	S3	1	6.7
Total		15	100

Table 3 shows that of the 15 respondents in this study, most of them had the most recent education, namely SMA as many as 6 respondents, while the least, namely S3, was 1 respondent.

### 3.4. Type of Drinking Water

**Table 4** Distribution of Types of Drinking Water Used for Processing Iced Tea Drinks in Baruga District

No	Type of drinking water	Amount	
		N	%
1	Water gallon	13	86.7
2	Cooking water	2	13.3
Total		15	100

Table 4.5 shows that of the 15 samples of iced tea drinks, 13 food stalls used gallons of water, while the least used boiled water was 2 food stalls.

### 3.5. Types of Main Raw Materials for Iced Tea Drinks

**Table 5** Distribution of Main Raw Material Types of Iced Tea Drinks in Baruga District, Kendari City

No	The main raw material for iced tea	Amount	
		N	%
1	Tea Dip	14	93.3
2	Tea powder	1	6.7
Total		15	100

Table 5 shows that of the 15 food stalls that sell iced tea drinks, 14 food stalls use dip as the main raw material for making iced tea drinks, and there is 1 food stall that uses original tea powder as a raw material for making iced tea drinks.

### 3.6. Univariate Analysis of Research Variables

Presence of *Escherichia coli* Bacteria in Iced Tea Drinks

**Table 6** Laboratory Test Results for the Presence of *Escherichia coli* Bacteria in Iced Tea Drinks

No		Presence of <i>Escherichia coli</i> bacteria in iced tea		amount	
		N	%		
1	There is	6	40.0		
2	There aren't any	9	60.0		
Total		15	100		

Table 6 shows that there were 15 iced tea samples, 6 of which were contaminated with *Escherichia coli* bacteria, while 9 samples were not contaminated with *Escherichia coli* bacteria.

**Table 7** Test Results for the Presence of *Escherichia coli* Bacteria in Ice Tea Drinks in Baruga District, Kendari City

No	Sample code	Check parameters	results	Inform.
1	2	3	4	5
1	W.M 1	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
2	W.M 2	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were found	TMS
3	W.M 3	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were found	TMS
4	W.M 4	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were found	TMS
5	W.M 5	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were found	TMS
6	W.M 6	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
7	W.M 7	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were found	TMS
8	W.M 8	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
9	W.M 9	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
10	W.M 10	Bakteri <i>Escherichia coli</i>	Ditemukanbakteri <i>Echerichia coli</i>	MS
11	W.M 11	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
12	W.M 12	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
13	W.M 13	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
14	W.M 14	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS
15	W.M 15	Bakteri <i>Escherichia coli</i>	<i>Escherichia coli</i> bacteria were not found	MS

Information: MS: qualify; TMS : not eligible; Kadar Maksimum :0/100 ml sample

**3.7. Handler Hygiene**

**Table 8** Hygiene Distribution of Handlers, Iced Tea Drinks in Food Stalls, Baruga District, Kendari City

No	Handler higiene	Amount	
		N	%
1	Qualify	9	60.0
2	Not eligible	6	40.0
Total		15	100

Table 8 shows the results of the observation of the iced tea drink handlers' questionnaire showing that out of 15 questionnaires, there were 9 who met the requirements with a percentage of 60.0% and 6 iced tea drink handlers who did not meet the requirements with a percentage of 40.0%.

**Table 9** Sanitation Distribution of Iced Tea Processing Places in Food Stalls, Baruga District, Kendari City

No	Processing place sanitation	Amount	
		N	%
1	Qualify	10	66.7
3	Not eligible	5	33.3
Total		15	100

Table 9 shows the results of the observation of sanitation questionnaires for processing places for iced tea, showing that out of 15 questionnaires, 10 questionnaires met the requirements with a percentage of 66.7% and sanitation for processing places that did not meet the requirements were 5 with a percentage of 33.3%.

## 4. Discussion

### 4.1. Presence of *Escherichia coli* bacteria

*Escherichia coli* is the most abundant normal flora in the intestines of humans and animals to be excreted in the feces. Pathogenic microorganisms found in feces are capable of transmitting various diseases if they enter the human body, in one gram of feces there can be one billion infective virus particles that can survive several days at temperatures below 1000C. *Escherichia coli* bacteria are bacteria that can cause complaints of diarrhea. This disease is one of many other diseases that can be caused by the poor food quality. The main sources of food and drink contamination come from workers, garbage, insects, rats, and the environment such as air, equipment, and water (8).

The main factors that make iced tea drinkable by bacteria are due to the addition of ice and water, how to brew the tea, the tools used in the sales environment, the maker, the hygiene of the handler's sanitation, and the washing of equipment. This can result in the proliferation of *Escherichia coli* bacteria found in iced tea drinks. *Escherichia coli* found in food and drinks that enter the human body can cause symptoms such as cholera, dysentery, gastroenteritis, and diarrhea.

Based on laboratory tests carried out with a total of 15 samples, 6 of them were positive for *Escherichia coli* bacteria with a percentage of 40.0%. The iced tea drink samples were taken at a food stall in the Baruga sub-district, Kendari city. This result is not by the Regulation of the Minister of Health of the Republic of Indonesia Number 492/Menkes/IV/2010 concerning the requirements for drinking water quality. The main microbiological parameter that determines the quality of drinking water is the presence of *Escherichia coli* with the maximum level allowed in the regulation being 0 (zero). One of the factors for contamination of *Escherichia coli* bacteria in iced tea drinks is not wearing an apron when serving iced tea drinks, handlers not washing their hands when they want to process drinks, talking when handling drinks, landfills that are not by the provisions, namely having a cover and having to remove it when it is full and several food stalls do not have trash facilities where the trash is immediately disposed of in the backyard of the shop, and the drinks sold do not wear a cover so that flying dust can be contaminated with these drinks which can carry pathogenic bacteria into the iced tea drink.

### 4.2. Handler hygiene

Handler hygiene is a very important role in processing food and drinks, several important roles that must be considered by handlers include washing hands properly and cleanly before processing and after processing drinks, wearing personal protective equipment such as aprons and head coverings for drink handlers, paying attention to personal hygiene to apply drink handlers to avoid bacteria that can breed in the drink (9)

Handler hygiene is one of the most important categories in beverage processing. Handlers who do not pay attention to cleanliness, the drink will be contaminated with bacteria that can cause disease if consumed. Based on the results of the study it appears that some handlers did not meet the requirements in this case the handlers did not close the wound

which could cause bacteria to multiply properly, and the handlers' hands were not washed before processing the drink and after processing it, the drink handlers did not wear aprons, and the handlers spoke when processing the drink so that it triggers the arrival of bacteria.

### 4.3. Processing Place Sanitation

Sanitation of the processing area is one of the main factors that becomes a reference for the occurrence of contamination of beverages, both originating from food ingredients, handlers, places, and equipment used. Food and drink can be unsafe for consumption because of contamination that occurs in food and drink which can be a medium for disease. One source of disease transmission and the cause of food diarrhea is food and drink that does not meet hygiene requirements. The hygienic condition of food and drink, among others, is influenced by the hygiene of tools, cooking utensils, and cutlery used in the process of preparing food and drink, as well as the drinking water provided (10).

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## 5. Conclusion

The hygiene of the handlers of traders for iced tea drinks in food stalls in the Baruga sub-district of Kendari city shows that the nine food stalls meet the requirements of handler hygiene while six of them do not meet the requirements of handler hygiene. Sanitary hygiene of iced tea processing facilities located in food stalls in Baruga sub-district, Kendari City, shows that ten food stalls meet the sanitary hygiene requirements for the processing area, while five of them do not meet the sanitary hygiene requirements for the processing facility. The results of laboratory tests regarding the presence of *Escherichia coli* bacteria in the iced tea drink, eight samples were negative or did not contain *Escherichia coli* bacteria, while seven samples were positive or contained *Escherichia coli* bacteria.

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## Compliance with ethical standards

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All authors in the making of this scientific article have no conflict of interest.

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