



THE EXISTENCE OF *ESCHERICHIA COLI* BACTERIA ON THE DRINKING SERVICE OF ICE TELLER

Henni Kumaladewi Hengky^{1*}, Andi Nuddin², Makhrajani Majid³, Fitriani Umar⁴, Ayu Dwi Putri Rusman⁵, Usman⁶, Nurhuda⁷ and Tenri Esa⁷

^{1,3-6}Public Health, Faculty of Health Sciences, Universitas Muhammadiyah Parepare, Indonesia

²Agribusiness Study Program, Postgraduate, Universitas Muhammadiyah Parepare, Indonesia

⁷Public Health, Graduated School, Universitas Muhammadiyah Parepare, Indonesia

⁸Faculty of Medical Science, Universitas Hasanuddin, Indonesia

*Corresponding author E-mail : henikd@umpar.ac.id

Abstract

This study aims to show the relationship between sanitation hygiene and the presence of *Escherichia coli* bacteria in ice Teller. The subject of 20 ice Teller carts examined the *Escherichia coli* bacteria content, and 40 drink handlers were observed related to hygiene and sanitation. The presence of *Escherichia coli* bacteria was carried out by laboratory tests using the most probable number method. In contrast, hygiene and sanitation of the handlers used observation sheets using the chi-square test. Significant relationship in the selection of raw materials (p-value 0.000), storage of ready-made drinks (p-value 0.017), transportation of drinks (p-value 0.000), beverage presentation (p-value 0.017) with the presence of *Escherichia coli* bacteria. Insignificant relationship between beverage processing (p-value 0.056) and the business environment of beverage sales (p-value 0.423) with the presence of *Escherichia coli* bacteria in ice Teller drinks. Our result confirmed that in the presence of *Escherichia coli* bacteria in ice Teller is caused by the choice of raw materials, storage of ready-made food, transportation of drinks, and serving of drinks.

Keywords: *Escherichia coli* Bacteria; Ice Teller; Hygiene and Sanitation.

Introduction

Unhygienic and sanitary food and beverage management can result in the presence of ingredients in food and drinks that can cause health problems for consumers. Food and drink can cause disease due to 2 things, namely containing toxic components (heavy metals and toxic chemicals) and contaminated by pathogenic microorganisms in sufficient quantities to cause disease (*Salmonella thyposa*, *Shigella dysentriae*, hepatitis virus, *Escherichia coli* and others). Health problems that occur in the form of disorders of the digestive tract with symptoms are nausea, heartburn, vomiting, and diarrhea (Naria, 2006; Osawa *et al.*, 2013).

Food and beverage snacks are small-scale industries that usually pay little attention to sanitation and food safety. They do not know the standard of food and beverage processing in accordance with the Republic of Indonesia Decree. No. 942/MENKES/SK/VII/2003 concerning Requirements for Snack Food Sanitation Hygiene.

One of the snacks that is much favored by the community is ice Teller. This drink is a drink that is fresh and suitable to eat in hot weather. An ice Teller drink is a drink that is cooled with ice cubes and then mixed with various kinds of fruit, sugar, coconut milk, and sweetened condensed milk. An ice Teller drink can be contaminated by microbes if the hygiene of the beverage processing is not good, and the water used is not boiled until it can indicate the presence of coliform bacteria namely *Escherichia coli* in the

ice Teller drink so that this drink can be an intermediary for diarrheal disease.

In general, these bacteria are known to be present normally in the digestive tract of humans and animal (Osawa *et al.*, 2013). Its existence outside the human body is an indicator of sanitation, that food and drinks have been contaminated by human waste or not. The presence of *Escherichia coli* in water or food is also considered to have a high correlation with the discovery of germs (pathogens) in food (Kurniadi *et al.*, 2013). The main sources of food contamination come from workers, equipment, garbage, insects, rodents, and environmental factors such as air and water (Thaheer, 2005).

Several researchers have attempted to estimate the total burden of waterborne diseases worldwide. The waterborne disease might account for one-third of the intestinal infections worldwide (Hunter, 1997), while it is estimated that water, sanitation, and hygiene were responsible for 40% of all deaths and 5.7% of the total disease burden occurring worldwide (Prüss and Kay, 2002). Human, livestock, and wild animals are all sources of fecal contamination; in general, human fecal waste gives rise to the highest risk of waterborne disease (Craun, 1996). A wide spectrum of pathogenic agents can be found in water, and monitoring for their presence on a routine basis is impractical (Odonkor and Ampofo, 2013).

Materials and Methods

This type of research used in this research is observational analytic with Case-Control Study design. Primary data obtained from examinations and direct interviews with respondents based on a questionnaire conducted in a guided and directed manner to look for risk factors that affect glucose disorders in students.

This study involved new students majoring in postgraduate health masters at the Muslim University of Indonesia (UMI) consisting of a case group of 62 blood glucose ≥ 90 mg/dL students and a control group of 62 blood glucose levels < 62 students.

Ice Teller and sanitary hygiene

The Ice Teller used in this study was drunk that is cooled with ice cubes mixed with various kinds of fruit, sugar, coconut milk, and sweetened condensed milk. Hard ice is put into a special flask and given a code to distinguish. The ice Teller is allowed to melt, and then the water is taken and put into a sterilized bottle, and laboratory tests are carried out using 10 ml of broth (Lauril Triptosa) in Durham and dilution of each sample. Incubate the sample at $35^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ for 2×24 hours. In the assertion test using Brilliant Greenbile Lactose Broth (BGLB) broth by incubating the test tube into the incubator at a temperature of $44^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$. Gas-filled tubes in samples or media indicate the presence of *Escherichia coli* bacteria using the Most Probable Number (MPN) method.

Subjects

We conducted analytical survey research by observing 4 Parepare City crowds with 20 carts of ice Teller snacks that were examined for the content of *Escherichia coli* bacteria, and 40 drink drinkers were observed for hygiene and sanitation.

Analytic design

It was an analytic study with a cross-sectional study design. The subjects consisted of ice Teller traders based on-site surveys and were most frequently visited by the surrounding community, whereas the *Escherichia coli* bacteria is obtained by ordering the stoned ice drink. This research lasted for 1 month by dividing the points of the crowd in the City of Parepare, namely Bacukiki District, Bacukiki Barat District, Ujung District, and Soreang District.

Results

Table 1 : The Content of *E. coli* Bacteria

Sample CODE	MPN Index by 100 ml	<i>E. coli</i> Bacteria	Information
A	19	+	Not Eligible
B	≥ 2400	+	Not Eligible
C	290	+	Not Eligible
D	≥ 2400	+	Not Eligible
E	≥ 2400	+	Not Eligible
F	≥ 2400	+	Not Eligible
G	≥ 2400	+	Not Eligible
H	290	+	Not Eligible
I	≥ 2400	+	Not Eligible
J	≥ 2400	+	Not Eligible
K	53	+	Not Eligible
L	19	+	Not Eligible
M	1100	+	Not Eligible
N	44	+	Not Eligible
O	≥ 2400	+	Not Eligible
P	≥ 2400	+	Not Eligible
Q	1100	+	Not Eligible
R	≥ 2400	+	Not Eligible
S	≥ 2400	+	Not Eligible
T	1100	+	Not Eligible

The results of the analysis showed that in 20 samples of stoned ice drinks, the highest bacterial content was 55%, and the moderate bacterial content was 15% (Table 2).

Table 2 : Frequency Level of *E. coli* Bacteria Content

Bacterial Content	Frequency (F)	Percentage (%)
High	11	55
Medium	3	15
Low	6	30
Total	20	100

The results of the analysis are hygiene sanitation with the existence of *Escherichia coli* bacteria, Significant relationship in the selection of raw materials (p-value 0.000), storage of ready-made drinks (p-value 0.017), transportation of drinks (p-value 0.000), beverage presentation (p-value 0.017) with the presence of *Escherichia coli* bacteria. Insignificant relationship between beverage processing (p-value 0.056) and the business environment of beverage sales (p-value 0.423) with the presence of *Escherichia coli* bacteria in ice Teller drinks (Table 3).

Table 3 : Sanitary Hygiene in the Presence of *Escherichia coli* Bacteria

Sanitary Hygiene	Content of <i>E. coli</i> Bacteria			P-Value
	High (n=22)	Medium (n=6)	Low (n=12)	
Raw Material Selection				0.000
High	12(30)	0(0)	12(30)	
Medium	10(25)	6(15)	8(20)	
Low	0(0)	0(0)	4(10)	
Beverage Processing				0.056
High	6(15)	0(0)	0(0)	
Medium	16(40)	6(15)	12(30)	
Low	0(0)	0(0)	0(0)	

Storage quality of ready-Made drinks				
High	8(20)	0(0)	0(0)	0.017
Medium	14(35)	6(15)	12(30)	
Low	0(0)	0(0)	0(0)	
Transportation of drinks				
High	0(0)	0(0)	0(0)	0.000
Medium	22(55)	6(15)	6(15)	
Low	0(0)	0(0)	6(15)	
Quality of beverage presentation				
High	8(20)	0(0)	0(0)	0.017
Medium	14(35)	6(15)	12(30)	
Low	0(0)	0(0)	0(0)	
The quality of the beverage Sales business environment				
High	2(5)	0(0)	0(0)	0.423
Medium	20(50)	6(15)	12(30)	
Low	0(0)	0(0)	0(0)	

Discussion

The content of *Escherichia coli* bacteria which is in the value of 19 to ≥ 2.400 by 100 ml indicates that the positive drink ice Teller contains *Escherichia coli* bacteria so that the quality of drinking water used in the drink ice Teller is not meeting the requirements, and this is in accordance with the Minister of Health Regulation No.492/Menkes/PER/IV/2010 Concerning drinking water quality requirements where the content of *Escherichia coli* bacteria is 0 by 100 ml (RI Ministry of Health). The microbiological quality of drinking water is a concern to consumers, water suppliers, regulators, and public health authorities alike the microbiological quality of drinking water is a concern to consumers, water suppliers, regulators, and public health authorities alike. The potential of drinking water to transport microbial pathogens to a great number of people, causing subsequent illness is well documented in countries at all levels of economic development (Dufour, 2013; Payment, 1997). It is stated that most sporadic cases of waterborne intestinal illness will not be detected or, if detected, may not be recognized as water-related (Isaac-Renton *et al.*, 1996).

Pollution from bacterial contaminants can be caused by sellers (food handlers) who do not pay attention to hygiene aspects of food and beverage sanitation and the surrounding environment (conditions of the place of sale).

Conclusion

Our results confirm that the content of *Escherichia coli* bacteria in Es Teller drinks that are sold at several crowded spots in the City of Parepare positively contains *Escherichia coli* bacteria, so the quality of drinking water used in the ice Teller drink is not eligible. Whereas sanitation hygiene based on 4 parameters used has a significant relationship with the presence of *Escherichia coli* bacteria in an ice Teller drink, and 2 other parameters do not have a significant relationship.

References

Craun, G.F. (1996). Water quality in Latin America: balancing the microbial and chemical risks in drinking water disinfection, in Water quality in Latin America: balancing the microbial and chemical risks in drinking

water disinfection, Pan American Health Organization, 211.

- Dufour, A. (2003). Assessing microbial safety of drinking water: improving approaches and methods/edited by Al Dufour.
- Hunter, P. (1997). Waterborne disease: epidemiology and ecology. John Wiley & Sons.
- Isaac-Renton, J.; Moorehead, W. and Ross, A. (1996). Longitudinal studies of Giardia contamination in two community drinking water supplies: cyst levels, parasite viability, and health impact., Appl. Environ. Microbiol., 62(1): 47–54.
- Kurniadi, Y.; Saam, Z. and Affandi, D. (2013). Factors of *E.coli* Bacteria Contamination in Snack Food in the Primary School Canteen in the Bangkinang District, Journal of Environmental Sciences, 7(1).
- Naria, E. (2006). "Hygiene Food and Beverage Sanitation at the USU Complex".
- Osawa, K. *et al.*, (2013). "Frequency of diarrheagenic *Escherichia coli* among children in Surabaya, Indonesia," Japanese journal of infectious diseases, 66(5): 446–448.
- Odonkor, S.T. and Ampofo, J.K. (2013). *Escherichia coli* as an indicator of bacteriological quality of water: an overview, Microbiology research, 4(1): e2–e2.
- Payment, P. (1997). Epidemiology of endemic gastrointestinal and respiratory diseases: incidence, fraction attributable to tap water and costs to society, Water Science and Technology, 35(11–12): 7–10.
- Prüss, A.; Kay, D.; Fewtrell, L. and Bartam, J. (2002). Estimating the burden of disease due to water, sanitation, and hygiene at the global level, Geneva: World Health Organization, Centre for Research into Environment and Health, 110: 537–42.
- RI Ministry of Health (2003). Decree of the Minister of Health of the Republic of Indonesia Number 942 / MENKES / SK / VII / 2003, Concerning Guidelines for the Requirement of Food Hygiene Sanitation. Jakarta: Indonesian Ministry of Health.
- Thaheer, H. (2005). HACCP Management System (Hazard Analysis Critical Control). Jakarta: Earth Literacy.