Bacteriological Test of Food Equipment in Basic School Canteen Working Area UPTD Puskesmas Mabelopura

Finta amalinda[1], Novi susanti[2], Miswan[3], Nur afni[4], Arief muliawan[5], Agus halid[6]
{finta274866@gmail.com[1], novisusanti051187@gmail.com[2], miswan.wanling@gmail.com[3]}

Department of Public Health, Universitas Muhammadiyah Palu, 94118 Indonesia[1,2,4], Department of Mathematics and science, Universitas Tadulako, 94118 Indonesia[3,5,6]

Abstract. This study aims to test the bacteriology of food utensils in the elementary school canteen of the UPTD Puskesmas Mabelopura. The research object is tableware. Bacterial samples on cutlery were taken using the swab method (wiping the surface of the cutlery) then the samples were taken to the laboratory to be tested. 8 cutlery samples were taken from 8 canteens in elementary schools in the working area of the UPTD Puskesmas Mabelopura. The laboratory test results identified the number of germs on the examined tableware, namely, plate 22 CFU/cm², 39 CFU/cm², 23 CFU /cm², spoon 1,513 CFU/cm², 939 CFU/cm², glass 2,217 CFU/cm², 251 CFU/cm², bowl 1,727 CFU/cm² Which indicates that the equipment in the canteen does not meet the eligibility requirements for tableware, because based on Permenkes RI No. 1096/Menkes/Per/VI/2011 regarding the requirements for tableware used, especially by traders, that it should not contain bacterial colonies or 0 colonies/cm² surface.

Keywords: Bacteri, Cutlery, Diarrhea, school canteen

1 Introduction

The morbidity and mortality rates in Indonesia due to diarrhea are still high [1]. Approximately 760,000 children die each year due to diarrheal disease which is the second leading cause of child mortality. Diarrhea that lasts for several days causes severe dehydration and loss of excess body fluids. Diarrhea is caused by contamination of food and water sources, it can also be caused by eating utensils that do not meet health standards [2].

Street food can be found in almost every school, especially elementary schools. This place to sell food is called a canteen. The canteen usually provides the food needs of school residents. The school canteen is managed by canteen officers. The operation of the canteen must follow procedures on how to process and maintain the cleanliness of the canteen. The types of food provided must also meet at least 4 healthy and 5 perfect [3].

Based on Law Number 7 of 1996 concerning food, it states that the quality of food consumed must meet several criteria, including being safe from biological, microbiological, chemical, heavy metal, and other contaminants that can endanger health [4]. Apart from food quality, it is also important to pay attention to the health of food and beverages so that there is

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no contamination of the growth of germs and additives that come from the food handling process served by traders. Factors that need to be considered in food processing are the quality of the equipment used in processing food ingredients, as well as those used to serve to consumers [5].

Food utensils, play an important role in the spread of disease. Unclean eating utensils can contain bacteria, as a result, bacteria entering the body can cause poisoning and even death if a person does not have a strong immune system [6]. Cleaning good cutlery will minimize or prevent bacterial contamination of tableware. This requirement must be known and implemented by food processors or traders and handlers [7].

The World Health Organization (WHO) estimates that 1 in 10 people suffer from congenital diseases and 420,000 people die every year as a result. Foodborne diseases that exist in various industrialized countries today indicate that 60% of cases are caused by poor food handling techniques, and contamination occurs when served in food processing facilities (TPM). The role of sanitation is very important in an effort to prevent the possible growth and development of rotting microbes and pathogens in food, beverages, equipment, and buildings that can damage food and endanger humans [8].

In Indonesia, foodborne illness is still a public health problem due to frequent reports of food poisoning in many areas. From January to March 2016, there were 31 incidents of food poisoning (30 food, 1 drink). 12 consecutive foods-induced poisoning incidents of food poisoning with 354 victims 2 of them died, food poisoning with a total of 190 people with 1 death, processed food in packs of 3 incidents of poisoning with 120 victims, and 1 incident of poisoning due to adulterated liquor with a total of 42 victims with 24 victims died [8].

In Central Sulawesi Province, in 2018 there were 3 outbreaks of food poisoning with 102 cases without any deaths. There was a decrease in the frequency of incidents compared to the Food Poisoning Outbreak in 2017 with 7 incidents with 354 cases without any death cases [9]. And in 2019 the overall Food Poisoning Outbreak occurred as much as 170 cases without death. Occurred in 5 districts / cities with the highest number in Parimo Regency with 72 cases, Palu City 55 cases with 2 times the frequency of incidents in different Puskesmas work areas, Buol District 17 cases, in Tolitoli Regency 2 times the frequency of food poisoning outbreaks with 16 cases and District Poso as many as 10 cases [10].

Mabelopura Puskesmas is one of the Puskesmas in Palu City. In the work area of the UPTD Puskesmas Mabelopura, there are 8 primary schools located in 2 urban villages, Tatura Utara and Tatura Selatan villages. Based on the preliminary observations made, it can be seen a picture of street food in the school canteen with a lot of visitors in one of the canteens, snack food in the form of yellow rice, fried rice, and syrup drinks. So that the use of cutlery in the form of plates, spoons, bowls, and glasses that are widely used by students. And seeing the conditions of the canteen which do not meet the requirements for the tableware washing technique, because it does not use water that flows from the tap, only uses tamping water in a bucket container.

Based on this description, the researchers are interested in conducting a bacteriological test on the food equipment for the elementary school canteen in the UPTD Puskesmas Mabelopura working area.

2 Research Method

2.1 Flow of research concept framework

The flow of the research concept framework can be seen as follows:

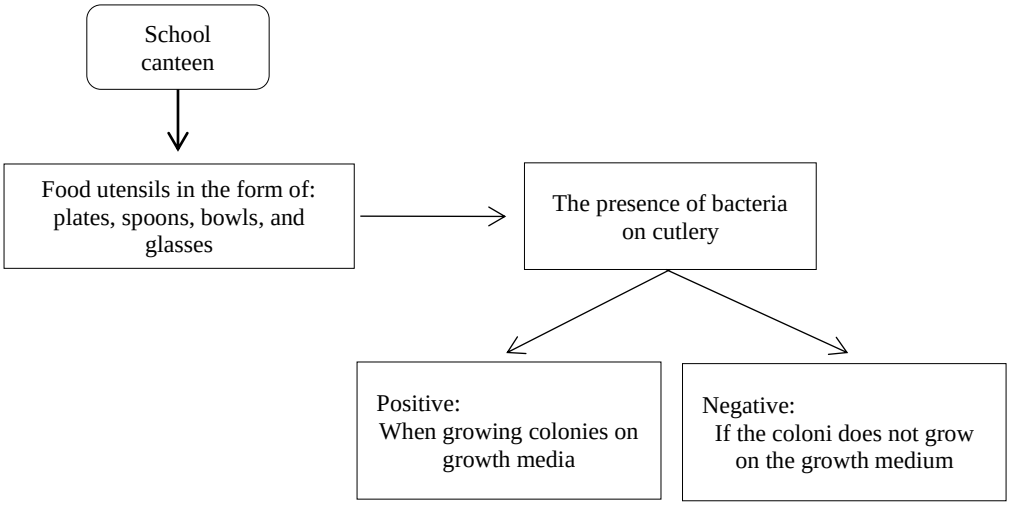

Fig. 1 Flow of concept outline

2.2 Research sites

Samples were taken from eight elementary school canteens whose locations are still in the work area of the UPTD Mabelopura Health Center in 2020. As for the testing, it was carried out in the Laboratory of the Poltekkes Palu Environmental Health Department.

2.3 Research time

This research was conducted in February 2020.

2.4 Object of research

The object of this research is tableware in the State Elementary School Canteen in the working area of the UPTD Puskesmas Mabelopura.

2.5 Research procedure

Several procedures were carried out in this study, namely:

2.5.1. Sampling technique

1. Prepare equipment and materials to be used
2. wear sterile gloves at the time of sampling

3. the cutlery to be checked is 4-5 each type of cutlery taken randomly from the storage area
4. Prepare a sterile cotton swab, open the bottle cap and insert a sterile cotton stick into it
5. The cotton stick in the bottle is pressed against the wall of the bottle, then removed and rubbed on each cutlery (plate, spoon, bowl, glass)
6. The surface where the appliance/furniture is rubbed, namely:
    - Plates: the inner surface on wich food is placed
    - Spoon: theouter and inner surfaces of the entire spoon bowl
    - Bowl: the surface in which food is placed
    - Glass: outer and inner surface of the lip as high as 6 mm

2.5.2. How to do the swab/swab technique:

1. With plates and bowls with two strokes on the surface of the food container with a square crossing between one stroke and the second stroke line.
2. On the spoon wipe the entire outer and inner surface.
3. On a glass with strokes around the surface area.
4. Each surface area that was wiped was carried out 3 times in succession, and 1 cotton stick was used for one group of cutlery that was examined.
5. Each result of rubbing one cutlery from one group was put into a bottle of liquid which was rotated and pressed against the wall, then repeated until all groups were taken.
6. After all the cutlery groups or the surface area of the cutlery are wiped, the cotton stick is put into the bottle, the lid is broken or cut, and the bottle's lip is heated with a spits fire, then covered with cotton.
7. The sample is labeled with a collotype attached, the label contains information about: the place for taking the sample, the name of the sample / tool, and is given a number / code.
8. The sample is immediately taken to the laboratory under cold temperature for examination.

2.5.3. How sample inspection works:

1. Prepare 4 media of diluting distilled water, then coded according to dilution 10^{-1}, 10^{-2}, 10^{-3}, and control.
2. Taking samples of equipment in PBS media, shaking until homogeneous, sterile pipette 1 ml poured in a 10^{-1} dilution, then shaken.
3. From a 10^{-1} dilution, pipette back 1 ml and pour in a 10^{-2} dilution.
4. From a 10^{-2} dilution, another 1 ml pipette was poured in a 10^{-3} dilution.
5. For the control pipette 1 ml of sterile distilled water is poured into a petridisk dish
6. Sterile petridisk plate container, provide dilution and control code.
7. Pipette 1 ml from planting and 10^{-3} dilution, and pour in a petri dish labeled 10^{-3}, then pipette 1 ml from planting at a 10^{-2} dilution, and pour into a petridish coded 10^{-2}, and pipette 1 ml from planting at a 10^{-1} dilution, and pour in a petridish that is coded 10^{-1}.
8. After that, pour the PCA media on everything with warm 15-20 ml, while shaking it slowly until homogeneous.
9. Pour until frozen, wrap with aluminum foil paper
10. Put in the best position incubator, incubate at 37ºC for 2x24 hours.
11. Read the colonies that grow with the colony counter, note the number of colonies.

3. Result and Discussion

3.1 Research Location Overview

UPTD Puskesmas Mabelopura is one of the Puskesmas in Palu City which is located at the street I Gusti Ngurah Rai No. 18 South Palu District, Palu City, Central Sulawesi Province. Mabelopura Puskesmas has 2 (two) working areas, namely North Tatura Village and South Tatura Village. As the technical implementing unit of the Palu City Health Office, the UPTD Puskesmas Mabelopura is responsible for organizing health development in its working area.

The canteen is a place that provides food and is in an elementary school environment. In the Mabelopura Puskesmas working area, there are 8 elementary schools. Each elementary school has 1 canteen. The description of the condition of the canteen in the primary school in the working area of the Mabelopura Community Health Center, namely; the location of the equipment washing place is not neat and cleanly arranged, the distance between the washing and the equipment rack is still very close. Equipment rack made of wood and not covered with plastic. The process of washing equipment that does not use running water, only by means of a container / tub, thus drying tableware using a damp cloth or napkin.

3.2 Research result

The study was started on February 1, 2020. By taking samples of bacteria on tableware in the canteen of the Primary School in the UPTD Puskesmas Mabelopura Work Area. Bacterial samples on tableware were examined at the Laboratory of the Environmental Health, Department of the Health Polytechnic of the Ministry of Health, Palu. The results obtained are as follows:

Table 1. Laboratory Examination Results of the Number of Germs on Tableware at the Primary School Canteen in the Mabelopura Community Health Center UPTD Work Area in 2020

No	Location	Sample Name	Check up result	CFU / CM^2 Standard
1	SDN 3 InpresTatura	Spoon	1513	0 CFU/cm^2
2	SDN 2 Tatura	Plate	22	0 CFU/cm^2
3	SDN 1 Tatura	Plate	39	0 CFU/cm^2
4	SD Bala Keselamatan Palu	Glass	2.217	0 CFU/cm^2
5	SDN Inpres 1 Tatura	Bowl	1.727	0 CFU/cm^2
6	SDN 2 Anoa	Glass	251	0 CFU/cm^2
7	MIS Al- Jufri	Spoon	939	0 CFU/cm^2
8	SDN Darusalam	Plate	23	0 CFU/cm^2

Based on table 1 above, it can be seen that the results of laboratory tests on the number of germs there are bacteriology on the tableware that are examined, namely, plates, spoons, bowls and glasses are carried out using the total plate count method, each calculated depending on the surface area of the sample being swabbed. From the results above, the sample examined shows that it does not meet the health requirements according to the Regulation of the Minister of Health of the Republic of Indonesia 1096 / Menkes / SK / VI / 2011 concerning the requirements for food sanitation sanitation, where the number of germs on tableware is equal to 0 (zero).

3.3 Discussion

The role of tableware used by food traders is an inseparable part of the principles of food hygiene. Every utensil (plate, glass, spoon) must be kept clean at all times. Cutlery that looks clean is not a guarantee that health requirements are fulfilled. For this reason, it is very important to know the basics of washing equipment, with good washing will produce clean and healthy equipment. Keeping tableware clean has helped prevent contamination or contamination of the food consumed [11]

Canteen sanitation has requirements that must be met, among others, with regard to sanitation facilities. Includes clean water, washing equipment. Cleanliness of cutlery is a very important part and affects the quality of food and beverages. Bacterial contamination can occur on cutlery. Lack of cleanliness of cutlery plays an important role in the growth and spread of bacteria [12]. Improper washing process by leaving food/oil and a number of germs on the surface of eating and drinking utensils. Leftover food / oil is a medium for bacteria and fungi to reproduce, while residual germs from the mouth/hands of consumers can be a source of infection for other consumers. Several pathogens identified in the oral cavity / saliva include Mycobacterium tuberculosis, Bacillus sp., S. Aureus, S. Epidermidis, E. coli, Haemophilus influenzae, herpes simplex viruses, hepatitis C virus, HIV, SARS-CoV-1, and SARS-CoV-2 [13]. In this study, taken as a sample, food utensils in the form of plates, spoons, glasses and bowls, where the cutlery is mostly used to serve snacks to students. Based on the research results obtained:

1. Tableware in the canteen of SD 2 Tatura 22 CFU / cm², SD 1 Tatura 39 CFU / cm², SD Darusalam 23 CFU / cm². None of the sample tests met, the equipment requirements. The shape of the plate is wide and easy to scrub with a washing sponge so that it is not done properly. When there are still dry food residues and no attention is paid to cleaning it will be a good medium for bacteria to grow. Likewise, the primary school canteen only uses a sink for washing water, and does not soak dirty cutlery, but is immediately washed, rinsed and in a cloth that is used repeatedly during the drying stage.
2. Spoon food utensils in the canteen of SD 3 Inpres Tatura examination test results are 1,513 CFU / cm², and spoons in the canteen of SD MIS Al-Jufri 939 CFU / cm². None of the sample tests met, the equipment requirements. The high total number of microbes in the spoon is influenced by several factors, including the handlers who wash the equipment, only dipping or putting the spoon into a water bath then rubbing it with a cloth and draining it. Washing cutlery that does not use running water and drying with a dirty cloth increases the number of germs.
3. Glass food utensils in the canteen of SD Bala Keselamatan examination test result are 2,217 CFU / cm², and glasses in the canteen of SD 2 Anoa with the results of the examination test results of 251 CFU / cm². None of the sample tests met, the

equipment requirements. This is because the shape of the glass which is difficult to reach in the deepest gap results in washing and rubbing only on the lip of the glass, this has the risk of growing bacteria that settle in the basic cracks, tends to be difficult to wash and wipe to dry because of the narrow shape of the glass inside. The risk of contamination if the place to put the glass is not in a clean condition. From observations in the canteen, it can be seen that the washing method does not use disinfectants and the washing tub water that is not replaced after being used several times. In addition, this is because the source of clean water is far from the canteen, so that flowing water is difficult to obtain.

4. Tableware bowl in the canteen of SD Inpres 1 Tatura 1,727 CFU / cm². Of the sample test does not meet the health requirements. The shape of the bowl is round and easy to rub with a washing sponge, but is not done properly when washing. Thus, in the primary school canteen, there is no washing with running water, only using water storage containers (buckets, trays), and drying using a cloth that is used repeatedly without being replaced so that it becomes a good medium for microbes.

How to wash cutlery should be done in a way, namely rough cleaning by removing food scraps on cutlery using a clean cloth using detergent / soap, then rinsing in a basin filled with clean water three times then stored on a dish rack and cover with a cloth. So that germ or bacteria do not land and multiply on the tableware [14]. And also the correct dishwashing technique according to the Ministry of Health (2009) consists of several steps, namely: Separation of dirt or food waste from cutlery, soaking (soaking can use chlorine water or by using warm water at a temperature of 82-100^{0}C, washing, rinsing with clean and running water, draining / drying [6].

The results of the research that have been carried out are in line with the results of research [5], the large number of colonies on cutlery is due to the washing / soaking process which contains dirt from the previous rinses, so that it will accumulate in the soaking water used and result in contaminating other equipment. Research [15], the number of germs on cutlery in the canteen are more than the number of germs allowed, the process of drying and storing cutlery is a major factor in the number of germs on cutlery. Research [11], the behavior of handlers during the washing process and after washing cutlery is stored or drained to dry in an open place so that it can be contaminated by dust, bacteria and disease-carrying vectors and can also be caused at the drying stage, contamination of storage damps and not protected from disturbing vectors, as well as final contamination before use of the equipment comes from the personal hygiene conditions of the handlers during direct contact with the equipment.

The results of this study are not in line with the research [2], which states that the washing technique is P value = 0.436 with a 95% confidence level and POR = 0.600 (95%; CI = 0.152 - 2.362), and tableware drying technique. P value = 0.772 with a confidence level of 95% and POR = 1.202 (95%; CI = 0.346 - 4.176), there is no relation to the total number of germs on tableware.

4. Conclussion

Based on the results of the research obtained, it can be concluded that all the cutlery samples taken from the elementary school canteen of the UPTD Puskesmas Mabelopura work area do not meet the eligibility requirements in accordance with the Republic of Indonesia Minister of Health Regulation No.1096 / Menkes / Per / VI /

2011 regarding the requirements for tableware, which are not may contain bacterial colonies or 0 colonies / cm² surface.

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