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Research Article

Bacterial contamination test on plates, spoons, and glass at a food stall (angkringan) Surakarta City, Central Java

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ABSTRACT

Cutlery is an important component that can affect the health of the digestive tract. Plates, glasses and spoons are eating utensils that are often used by the community. In the city of Surakarta, Central Java, there are many roadside food stalls that are in great demand by the community, namely Angkringan. The purpose of this study was to determine bacterial contamination of cutlery (pring, glass and spoon) at a food stall (Angkringan) in Surakarta City, Central Java. This research is a descriptive observational study, bacteriological examination of cutlery begins with swab sampling, bacterial examination using the Total Plate Number method, and confirmed by Gram staining. The results of the examination of the number of bacterial colonies were compared with the standard reference of Permenkes No. 1096/MENKES/PER/VI/2011, which is 0 colonies/cm^2. The results showed the average bacterial contamination in angkringan food stalls in Surakarta City, as follows: plate 10230 colonies/cm^2, glass 9560 colonies/cm^2 and spoon 3960 colonies/cm^2 . All cutlery that was inspected did not meet the standards of Permenkes No. 1096/MENKES/PER/VI/2011.

Keywords: *bacterial contamination, cutlery, total plate count.*

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INTRODUCTION

Cutlery is all kinds of tools used to process and serve food such as plates, spoons, forks, glasses and so on. The cleanliness of cutlery is influenced by washing, drying and storing the cutlery. Cutlery must be clean, free of toxic substances, and free from microorganism contamination (Amanda & Rachmaniyah, 2021). If cutlery is contaminated with bacteria, it can cause infections in the gastrointestinal tract, including gastritis, diarrhea, typhoid, and others (Farah Fadhilla, 2017). Bacteria that contaminate cutlery are *Enterobacter aeruginusa, Serratia marcescens, Escherichia coli* (Darna et al., 2018), *Proteus mirabilis, Salmonella typhosa, Shigella dysenteriae*, and *Klebsiella pneumonia*. (Ananda & Khairiyati, 2017). In the city of Surakarta, Central Java Province, there are many street food stalls known as Angkringan, it has become a culture for many people to like to eat at these angkringan because they serve a varied and always warm menu. Bacteriological tests of cutlery need to be carried out to determine the cleanliness of the cutlery from bacterial contamination (Farah-Fadhilla, 2017). The Total Plate Number is the method of choice that can be used to determine bacterial contamination on cutlery (Atimiati, 2012; Inayah & Muharram, 2020; Khaldun & Baharuddin, 2018). Bacterial contamination standards according to Permenkes No. 1096/MENKES/PER/VI/2011 is 0 colony/cm^2. The purpose of this study was to determine the bacterial contamination of cutlery used by the "Angkringan" stall in the city of Surakarta, Central Java province. Swab with colony growth indicator when planted on agar media.

METHODS

Type of research is descriptive observational, bacteriological test on cutlery using the Total Plate Number method. The research population is all "Angkringan" food stalls in Surakarta City, Central Java Province, the research technique uses quota sampling, the size of the research sample is 27 samples. cutlery, plates, glasses, and spoons. Sampling was carried out by means of a swab with the following conditions: the plate was swabbed on the inner surface where the food was placed, the spoon was swab on the outer and inner surfaces, the glass was swab on the outer surface of the lip of the glass, with a swab area of 1 cm^2 using a sterile cotton swab, then inoculated into a tube containing 0.9% NaCl which has been labeled (Lado et al., 2020; Marisdayana et al., 2017; Nikmah, 2018). The swab sample that has been obtained, was subjected to bacteriological examination with total plate number, the swab sample was diluted to a dilution of 10-2, then inoculated on NA media by pour plate, then incubated at 37oC for 24 hours. After 24 hours the growing bacterial colonies were counted (Novi et al., 2015; Permatasari, 2017). The growing colonies were subjected to gram staining. Gram staining was carried out as confirmation that the colonies growing on NA media were bacterial colonies (Sancoko & Rahmawati, 2019; Tumelap, 2011), using 3 replications.

RESULTS AND DISCUSSION

Student cognitive learning outcomes

The results of the examination of the number of bacteria on cutlery, plates, glasses and spoons (Figure 1), showed that the highest mean bacterial contamination was found on plates (10230 colonies/cm^2), then glasses (9560 colonies/cm^2), and the lowest on spoons (3970 colonies/cm^2). Bacterial contamination on plates, of the nine samples examined had a fairly large range, namely between 2500 to 38000 colonies/cm^2, the same thing also happened to bacterial contamination on glasses which had a range between 2400 to 31000 colonies/cm^2, while on spoons has the smallest range between 1200 to 7200 colonies/cm^2 (Table 1).

Table 1. Number of bacterial colonies on cutlery (plates, glass, and spoons)

Sample		Average number of colonies per sample (100 Coloni / cm^2)	Average contamination per cutlery (100 Coloni/cm^2)
Plate	P.1	25	102.3
	P.2	140	
	P.3	29	
	P.4	380	
	P.5	31	
	P.6	56	
	P.7	95	
	P.8	117	
	P.9	48	
Glass	G.1	42	95.6
	G.2	48	
	G.3	310	
	G.4	100	
	G.5	130	
	G.6	95	
	G.7	43	
	G.8	24	
	G.9	68	
Spoon	S.1	72	39.7
	S.2	46	
	S.3	25	
	S.4	68	
	S.5	30	
	S.6	31	
	S.7	45	
	S.8	12	
	S.9	28	

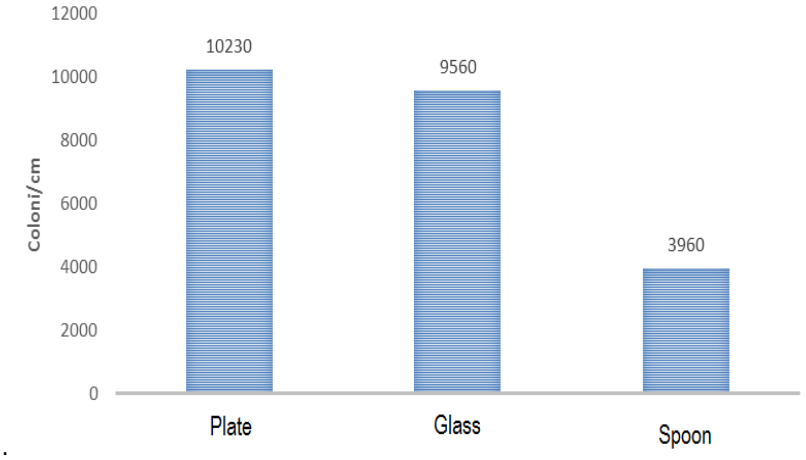
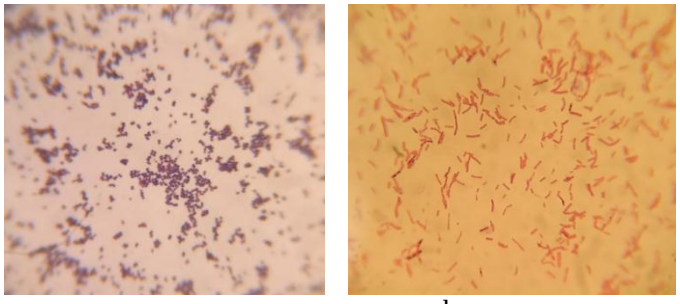


Figure 1. Bacterial contamination of cutlery (plates, glass, spoons colonies/cm^2).

After Gram staining and microscopic examination of each sample, several types of bacteria were found, including Gram-positive bacteria in the form of purple cocci, arranged in clusters, and Gram-negative bacteria with red rods in a scattered arrangement (Figure 2).



a. b.

Figure 2. Microscopic view of bacteria that contaminate cutlery with Gram stain, at an Angkringan in Surakarta City, Central Java (a: Gram positive coccus bacteria, b: Gram negative stem bacteria).

Observations from each of the 9 plates, glasses, and spoons showed that all samples were positive for bacteria. Based on the author's observations, this is due to several factors, including external contaminants, washing factors, and storage. Bacterial contamination of cutlery occurs through dust in the air carrying bacteria and sticking to cutlery. The location of Angkringan is located on the side of the road and is open, some Angkringan are only shaded by a tent roof, this can cause air that carries bacteria to contaminate cutlery and some of the food served. How to wash cutlery is also a factor that determines the contamination of cutlery, in general the Angkringan washes cutlery not with running water, using water that has been stored in a bucket and will only be replaced when the water looks dirty, even though using soap. Yulianto & Nurcholis (2015) stated that the washing medium with running water was better than the washing method with immersion media (tub). This is because in the washing process with running water, all the dissolved dirt will flow without contaminating the cutlery again, while in the soaking process it is possible that the dirt from the rinsing of cutlery will accumulate in the soaking water, thereby contaminating other equipment to be washed.

The results of this study are in accordance with research conducted by (Amanda & Rachmaniyah, 2021; Nikmah, 2018; Permatasari, 2017) which states that eating utensils used in roadside food stalls are generally contaminated with bacteria from various groups, although the type of bacteria is unknown. that pollutes it. Sancoko & Rahmawati (2019) stated that the process of washing and storing cutlery must meet the requirements to always be clean before use. Contaminants left behind due to improper washing of equipment will become a medium for microbial growth. According to (Marisdayana et al., 2017; Nikmah, 2018) eating utensils, especially those in direct contact such as glasses and spoons can cause disease transmission. Amanda & Rachmaniyah, 2021; Inayah & Muharram, 2020) states that eating utensils that are not clean and contain microorganisms can transmit disease through food or what is called foodborne disease.

The results showed that the cutlery used in several angkringan in Surakarta City was not clean and paid less attention to the sanitation of cutlery. For this reason, it is necessary to have basic knowledge about hygiene and sanitation of

cutlery to traders and provide understanding to the public to better maintain cleanliness when eating and drinking at angkringan food stalls. Further research is expected to identify the types of bacteria that contaminate the cutlery.

CONCLUSION

The results showed that all the cutlery examined were contaminated with bacteria, with the average bacterial contamination as follows: plates 10230 colonies/cm^2, glasses 9560 colonies/cm^2 and spoons 3960 colonies.cm^2. Found Gram positive bacteria in the form of coccus and Gram negative in the form of rods. All cutlery (plates, glasses, and spoons) at several angkringan in Surakarta City, Central Java do not meet Minister of Health Regulation No. 1096/MENKES/PER/VI/2011, which is 0 colonies/cm^2.

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