

Total Plate Count Test for Bacteria in Home industry Baby Porridge in the Malang City Area

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ABSTRACT

The growth and development of toddlers greatly influences the quality of human resources in the future so that the toddler years are an important period in human development. In nutritional development, food has an important role in growth. During the toddler years, apart from breast milk, babies also need additional food, namely MP-ASI. MP-ASI can be contaminated by chemical and biological contaminants, one of the biological contaminants in food is bacteria. The TPC (Total Plate Count) test is a test used to count the number of bacterial colonies in the media being tested. The stages carried out before testing are sample dilution and media formulation. This research aims to determine whether or not there are bacteria in samples of Home industry Baby Porridge sold in the city of Malang. The samples studied were 8 samples. The sampling technique was carried out by purposive sampling. Based on the research that has been carried out, it can be concluded that of the 8 samples of home industry baby porridge sold in the city of Malang, 2 samples meet the requirements with the condition that the number of colonies is 2×10^2 colonies/g. The remaining 6 samples did not meet the requirements

INTRODUCTION

The growth of the baby with increasing nutritional needs for its growth period. The development of gastrointestinal motor coordination has also enabled babies to receive food from the outside (Grueger, 2013). So, as the baby grows, it is necessary to get essential food from outside which is usually called complementary food with breast milk (MP-ASI). MP-ASI is made as food with a soft concentration that is made to reach the consistency of family food, this process is given gradually to babies.

MP-ASI is known to the public into two types, namely the factory type and the traditional type. Manufactured MP-ASI produces baby food that is relatively more hygienic and practical to serve. The nutritional content in manufactured MP-ASI can also be formulated based on the baby's nutritional adequacy angle (Hadnisngsih N, 2004). Traditional MP-ASI processing often does not meet the principles of food hygiene and sanitation, resulting in contamination by microorganisms that cause diarrhea in babies (Kusumawardani B, 2010).

The process of making food requires hygiene and sanitation to avoid contamination by bacteria and heavy metals which can affect health if consumed in certain levels. There are several things that need to be considered, namely selecting and storing food ingredients, food processing, storing ready-made food, distributing and serving food (Rahmadhani & Sumarmi, 2017).

Food has a very important role in the spread of various diseases. Diseases caused by food contamination are known as foodborne diseases (Nurmawati et al., 2019). Food that is unsafe for health is a threat to people around the world. Millions of people who suffer from foodborne diseases become ill and hundreds of thousands die every year (Bintsis, 2018).

Based on the Decree of the Minister of Health of the Republic of Indonesia Number 942/Menkes/SK/VII/2003 concerning Guidelines for Hygiene Sanitation Requirements for Snack Food, there are several aspects regulated in the handling of snack food, namely food handlers, equipment, water, food ingredients, food additives, presentation. and vending facilities. Several of these aspects greatly influence food quality (BPOM, 2006).

Diarrhea is characterized by a change in the shape of the stool from soft stools to containing mucus and blood, as well as an increase in the frequency of defecation to 3 or more times in 1 day. Based on the results of research conducted by Zakia et al., (2015), children aged 3 months to 7 years who suffered from diarrhea had *Escherichia coli* bacteria in their feces.

Bacteria that generally cause foodborne illnesses include *Salmonella*, *Campylobacter*, *Shigella*, *E. coli*, *Vibrio*, *Yersinia*, *Staphylococcus* and *Listeria*. Symptoms that appear due to foodborne diseases are generally determined by the source of infection. The most common symptoms are diarrhea, vomiting, nausea, stomach ache, fever and headache. Acute diarrhea usually occurs due to a single source of contamination such as bacterial infection (Nurmawati et al., 2019).

So from this incident the researchers wanted to see the bakery content using the Total Plate Number method from home industry baby porridge samples sold in the city of Malang.

LITERATURE REVIEW

MP-ASI

Complementary food is defined as food or drink other than breast milk that contains good nutrients for babies which is given during the transitional feeding period (Complementary feeding), namely when other food or drink is given along with breast milk. MP-ASI is introduced and given to babies in stages, both in form and quantity. This aims to adjust the ability of the baby's digestive system to receive MP-ASI (Ardhianditto et al., 2013).

Complementary food is food given in addition to breast milk for babies aged 6 months and over to meet their nutritional needs (Farida et al., 2016). At the age of 6 months to 24 months, it is recommended that complementary foods be given to breast milk, because at that time breast milk production begins to decline so that the nutritional supply from breast milk no longer meets the nutritional needs for the baby's growth and development (Ardhianditto et al., 2013).

Bacteria

Bacteria are typical prokaryotic cells, unicellular and do not contain membrane-bound structures in their cytoplasm. The cells are typically round, rod-like or spiral-shaped. A typical bacterium is about 0.5-1.0 μm in diameter and 1.5- 2.5 μm in length and reproduces mainly by simple binary fission, an asexual process. Some can grow at temperatures of 0°C, some grow well in hot water temperatures of 90°C or more. Most grow at various extreme temperatures (Wahyuni, 2016).

Bacteria are also living organisms that do not have a cell nucleus with a perfect nuclear membrane. Bacteria are a large group of prokaryotic organisms, apart from archaea which are very small and have a big role on earth, the structure of bacterial cells is very simple, namely without a cell nucleus or nucleus, cell skeleton, and other organelles such as mitochondria and chloroplasts. We can find bacteria everywhere, such as in water, air, soil, in symbiosis with other organisms or as pathogenic agents or parasites, even bacteria are also found in the human body (Effendi, 2020). Bacteria that cause disease through food are *Campylobacter*, *Salmonella*, *Yersinia enterocolitica* and *Listeria monocytogenes* (Chlebicz & Ślizewska, 2018).

TPC Test (Total Plate Count)

The TPC (Total Plate Count) test is a test used to count the number of bacterial colonies in the media being tested. The stages carried out before testing are sample dilution and media formulation. The media used in this test is NA (Nutrient Agar) media which is inoculated with samples using the spread plate method and incubated for 24 hours at 37°C (Nuria, 2009). Bacterial counts can be done by direct or indirect calculations. Direct counting (Petrof Hauser cell counter) is carried out by counting all the microbes in the media, both dead and live microbes, using a tool called a haemocytometer. Meanwhile, indirect

calculations are carried out in various ways. Some of these methods are filtration, plate count, dry weight measurement (Romadhon, 2016).

METHODOLOGY

Materials and Tools

The materials used in this research were samples of Traditional Home industry Baby Porridge MP-ASI sold in the Malang city area, PCA (Plate Count Agar) media, Buffered Peptone Water, Alcohol and sterile Aquades.

The tools used for this research are tube needles, sample bottles, autoclaves, hot plates, colony counters, petri dishes, test tubes, measuring cups, pipettes, spatulas, analytical scales, Bunsen, plastic wrap, aluminum foil, Ph paper, microscope, object glass, cover glass, micropipette, beaker, Erlenmeyer, cotton, label paper.

Sampling Techniques

The population in this study were 8 baby porridge traders in Malang City. Sampling technique is a way to determine a sample whose number corresponds to the sample size based on the actual data source, taking into account the characteristics and distribution of the population in order to obtain a representative sample. In this research, the sampling technique used was purposive sampling. Purposive sampling technique is a sampling technique by selecting samples according to the researcher's knowledge of the research (based on the research objectives or problems). All populations were sampled because from the survey results, the population found was very small.

Research Methods

In this study, total plate numbers were examined, namely counting the number of colonies growing on plate count agar (PCA) media from sample dilution using the pour plate method. Dilution aims to reduce the population of microorganisms because without dilution the growing colonies will accumulate, making it difficult to calculate the number of colonies (Santoso, 2009). Calculation of total plate numbers of microorganisms selected from petri dishes with a colony count of between 30-300. This is because agar media with a high number of colonies (> 300 colonies) are not validly counted so there is a very large possibility of a calculation error, while the number for small colonies (< 30 colonies) is not valid to be counted statistically. In determining the total plate number, the number of bacterial colonies that grow on the agar media is counted after incubation at 37°C for 24 hours. The coliform contaminant test procedure follows the National Standardization Agency SNI 2897:2008 concerning "Testing Methods for Microbial Contamination in Meat, Eggs and Milk.

Quality Terms and Conditions

Quality health requirements for MP-ASI in Indonesia are regulated by BPOM RI No. HK00.06.1.52.4011 concerning contamination limits microbes in MP-ASI with a maximum total microbial plate number of 2×10^2 colonies/g.

Results and Discussion

Home industry baby porridge was examined microbiology which aims to determine the quality of baby porridge. Determination quality porridge baby home industry the can done based on analysis of the presence of bacterial groups that are counted. The samples used were 8 samples found in the Malang city area.

RESULTS AND DISCUSSIONS

The results of the Total Plate Number test carried out using the method of pouring bacteria into home industry baby porridge sold in the city of Malang can be seen in table 1.

Table 1. Results of the TPC Method of 10^{-1} Dilution (average)

No	Sample	Amount Colony (Average)	Standard contamination/g	Information
1	S1	3.76×10^2	2×10^2 colonies/g.	TMS
2	S2	4.13×10^2	2×10^2 colonies/g.	TMS
3	S3	4.53×10^2	2×10^2 colonies/g.	TMS
4	S4	2.10×10^2	2×10^2 colonies/g.	TMS
5	S5	8.56×10^2	2×10^2 colonies/g.	TMS
6	S6	5.20×10^2	2×10^2 colonies/g.	TMS
7	S7	6.66×10^1	2×10^2 colonies/g.	M.S
8	S8	0	2×10^2 colonies/g.	M.S

Description: TMS (does not meet requirements), MS (qualifies)

Based on on table 1, so is known that sample S7 And S8 show results still under standard maximum contamination microbes so that it meets the health quality requirements of BPOM RI No. HK00.06.1.52.4011. while p in samples S1, S2, S3, S4, S5 AND S6 does not meet BPOM RI quality health requirements No HK00.06.1.52.4011 concerning contamination limits microbes in MP-ASI with a maximum total microbial plate number of 2×10^2 colonies/g.

The TPC test results obtained for home industry baby porridge turned out to contain bacterial colonies and were below the regulatory standards due to the possibility of the seller's lack of hygiene in making it, such as the seller not paying attention to cleanliness in making it and the environment where they were selling it was not clean, thus causing bacterial contamination. For sample exceeds the specified limits, colonies grow in samples of baby porridge may be caused by several factors such as storage time lagporridge baby sold to consumer Which too long, if method storing baby porridge is not as good as the storage container used and the environmental conditions where baby porridge is stored are not well maintained its cleanliness can trigger growth bacteria. Factor other Which can Triggering the growth of bacterial colonies is the presence of aerobic bacteria in the sample porridge baby home industry so that possibility No Pay attention to *Food Hygiene* and food sanitation when managing porridge baby home industry can become growth factors bacterial contamination. Research conducted by Zakia et al (2015) on children aged 3 months to 7 years who

suffered from diarrhea contained *Escherichia coli* bacteria in their feces. However, at the time this research was carried out, there were no incidents that caused diarrhea in toddlers due to consumption of home-made baby porridge.

CONCLUSIONS AND RECOMMENDATIONS

Based on the quality health requirements for MP-ASI in Indonesia regulated by BPOM RI No. HK00.06.1.52.4011 concerning contamination limits microbes in MP-ASI with a maximum total microbial plate number of 2×10^2 colonies/g. Based on research using the Plate Number method using home industry baby porridge samples sold in Malang, the results showed that 2 out of 8 samples met the requirements, sample 7 with a total of 6.66×10^1 and sample 8 with the number of colonies 0. Meanwhile the other 6 samples did not meet the requirements, with the number of colonies for each sample being S1 The number of colonies was 3.76×10^2 , S2 number of colonies 4.13×10^2 , S3 number of colonies 4.53×10^2 , S4 number of colonies 2.10×10^2 , S5 number of colonies 8.56×10^2 and S6 number of colonies 5.20×10^2 .

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