



HANDWASHING BEHAVIOR, SNACK EATING HABITS AND E.COLI CONTAMINATION WITH DIARRHEA IN ELEMENTARY SCHOOL STUDENTS IN TANJUNGPINANG CITY AND CIMAHI CITY

By

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ABSTRACT

Diarrhea is an endemic disease that has the potential to cause pandemic and is still a contributor to the mortality rate in Indonesia. The behavior of elementary school students in choosing snacks and hand washing with soap is often the cause of diarrhea. The purpose of this study was to determine the relationship between the habit of consuming snacks, hand washing behavior and E.coli contamination in snacks with the incidence of diarrhea in public elementary school students in Tanjungpinang and Cimahi, Indonesia. This study was a cross sectional design. The population in this study were all public primary school students in grades 4, 5 and 6 from 15 public primary schools in Bukit Bestari sub-district and 18 public primary schools in Cimahi Utara sub-district. Sampling was conducted using quota sampling method (30 students per school) so that the minimum number of samples reached 990 students. Based on the results of data analysis, it can be concluded that there is no relationship between hand washing and diarrhea in elementary school students. There is a relationship between the habit of eating snacks and consumption of snacks containing E.coli with the incidence of diarrhea in elementary school students.

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1. INTRODUCTION

Diarrhea is an endemic disease that has the potential to cause outbreak and is still a contributor to the mortality rate in Indonesia, especially in children under five years of age (Kemenkes RI, 2020b). Diarrheal infectious diseases are transmitted fecally-orally through food and drink contaminated with feces or bacteria or viruses that cause diarrhea, as well as through person-to-person contact or direct contact or with hands contaminated with infected feces (Ejemot et al., 2008).

Diarrhea disease in 2020 in Tanjungpinang City experienced a very significant decrease, namely by 41% with the number of cases only reaching 1,866 cases (Dinas Kesehatan Kota Tanjungpinang, 2020). In 2019, diarrhea cases at all ages in Cimahi City were 10,998 cases (74.3%) and in children under five reached 3,883 cases (44%). The target number of diarrhea findings in Cimahi City for all ages is 14,806 cases where those who have received health services reach 74.3% (Dinas Kesehatan Kota Cimahi, 2019).

One of the causes of diarrhea, especially in school children, can be caused by consumption patterns of unqualified snacks. Food poisoning outbreaks that occur in Indonesia (58.49%) are caused by microbiological contamination, both contaminated and suspected. One type of bacteria that is commonly found in food and can cause foodborne disease is *Escherichia coli* (Alfiriza, 2019). In 2020, 90 school snacks samples were tested using Formalin, Rhodamin B, Methanyl Yellow and Borax test-kits. The test results showed that all samples met the requirements (Loka POM Tanjungpinang, 2021). Microbiological examination has not been carried out on school snacks in 2020.

The behavior of elementary school students in choosing snacks and washing hands with soap (HWWS) is also often the cause of diarrheal diseases. The results of research in Bandung showed that 57.3% of children chose unhealthy food (Iklima, 2017). Research in Makassar showed that 71.4% of respondents who had poor eating behavior experienced diarrhea and there was a relationship between eating behavior and the incidence of diarrhea in children aged 3-6 years. The handwashing with soap variable also showed similar results where there was a relationship between handwashing behavior and the incidence of diarrhea (Fatmawati et al., 2015).

In Tanjungpinang City, there are 595 food processing places in the form of canteen / hawker food centers, which meet the requirements of only 37.1% (Dinas Kesehatan Kota Tanjungpinang, 2019). Similar results also occurred in Cimahi City where out of 1,911 TPM in the form of canteen / hawker food centers, only 34.7% met the requirements (Dinas Kesehatan Kota Cimahi, 2019).

The purpose of this study was to determine the relationship between the habit of consuming snacks, hand washing behavior and food quality in the form of *E.coli* contamination in snacks with the incidence of diarrhea in public elementary school students in Tanjungpinang City and Cimahi City. This research needs to be done considering that similar research has never been done in Tanjungpinang City and Cimahi City, while behavior and *E.coli* contamination are important to know as an effort to prevent the incidence of diarrhea, especially in elementary school students.

2. RESEARCH METHOD

This study used a cross sectional design. The population in this study were all public elementary school students in grades 4, 5 and 6 from 15 public elementary schools in Bukit Bestari Subdistrict and 19 public elementary schools in Cimahi Utara Subdistrict. Sampling was conducted using the quota sampling method where the researcher determined that each school would be taken as many as 30 students who would be sampled so that the minimum number of samples reached 1,020 students. The sample selection method begins with simple random sampling to determine which class will be used as the sample group. The next sample selection was carried out purposively with the inclusion criteria set, among others, students who have attended school for at least the last year at the research location and often consume snacks from the school canteen.

In addition to taking samples of elementary school students, this study also took samples of snacks, where the population was snacks that were prone to contamination with *E.coli* bacteria. Determination of the minimum number of food samples taken using the quota sampling method where the researcher determines each school will be taken as many as 3 samples of food prone to *E.coli* contamination, so that the minimum number of samples in this study is 102 snacks. To describe the hygiene sanitation of school canteens, data collection will also be carried out on canteen traders in each school totaling 34 school canteen traders.

Data collection methods were carried out by interviewing elementary school students and direct observation in the school canteen, while *E.coli* contamination data were obtained through laboratory examination of food with the TPC (Total Plate Count) method which will be carried out at the Center for Environmental Health and Disease Control Class I Batam and Laboratory of Health Polytechnic Ministry of Health Bandung.

3. RESULTS AND DISCUSSION

Respondents in this study reached 990 elementary school students consisting of 350 people from elementary schools in Tanjungpinang City and 640 elementary school students from Cimahi City. The characteristics of the respondents are presented in Table 1.

Table 1. Frequency Distribution of Respondents' Characteristics
Respondent Characteristics f (%)

Respondent Characteristics	f (%)
Gender	
Male	355 (35,9)
Female	635 (64,1)
Parent's occupation	
Civil servant/BUMN/BUMD	199 (20,1)
Private	210 (21,2)
Self-employed	84 (8,5)
Fisherman	28 (2,8)
Others	469 (47,4)
Number of family members	
> 4	355 (35,9)
≤ 4	635 (64,1)
Knowledge	
Poor	392 (39,6)
Good	598 (60,4)
Total	990 (100)

Respondents with female gender (64.1%) were more than respondents with male gender (35.9%). In this study, respondents were dominated by respondents who had parents with other job categories (47.4%) and worked in the private sector (21.2%). Most of the respondents had a total number of family members living in one house ≤ 4 (64.1%). This study also assessed the respondents' level of knowledge about school snacks. Most of the respondents had good knowledge about school snacks (60.4%). An overview of the frequency distribution of independent variables (hand washing behavior, eating behavior of school snacks, the presence of E.coli in school snacks consumed) and the dependent variable (history of diarrhea) is shown in Table 2.

Table 2. Frequency distribution of respondents' characteristics

Variabel	f (%)
Hand washing behavior	
No	18 (1,8)
Yes	972 (98,2)
Snacks eating behavior	
Poor	411 (41,5)
Good	579 (58,5)
Presence of E.coli	
Yes	56 (5,7)
No	933 (94,2)
History of diarrhea	

Yes	422	(42,6)
No	568	(57,4)
Total	990	(100)

Table 2 shows the results that almost all students perform hand washing (98.2%). school snacks eating behavior showed that most students had good school snacks eating behavior (58.5%). Most students did not consume school snacks contaminated with E.coli (58.5%) and most students did not have a history of diarrhea during the last 3 months (56,8%). The results of the chi square test in this study are shown in Table 3.

Table 3. Relationship between HWWS behavior, SCHOOL SNACKS eating behavior and the presence of E.coli with Diarrhea History

Variabel	History of diarrhea				<i>p-value</i>	Nilai OR (95%CI)
	Yes		No			
	42,6	%	57,4	%		
Hand washing behavior						
No	4	22,2	14	77,8	0,127	0,379 (0,124–1,159)
Yes	418	43,0	554	57,0		
Snacks eating behavior						
Poor	228	55,5	183	44,5	0,000	2,473 (1,906 – 3,207)
Good	194	33,5	385	66,5		
Presence of E.coli						
Ya	4	7,1	52	92,9	0,000	0,095 (0,034 – 0,265)
Tidak	418	44,8	568	57,4		

Table 3 shows the results of no association between hand washing behavior and diarrhea history with a p-value of 0.379 ($p > 0.05$). There is an association between the behavior of consuming school snacks with a history of diarrhea with a p-value of 0.000 ($p < 0.05$) and there is an association between the presence of E.coli with a history of diarrhea with a p-value of 0.000 ($p < 0.05$).

Elementary school students who are respondents in this study have good knowledge about school snacks consumption. The results of this study are in line with previous research where the level of knowledge of students about snack consumption is dominated by good knowledge. The findings in the field that most elementary school children like to consume fast food snacks such as fried meatballs, dumplings, colored drinks, all kinds of dinin drinks and the like. The high consumption of unhealthy snacks is due to children's lack of knowledge about the presence of unhealthy food additives such as flavorings and food coloring. In addition to knowledge of food substances, students also seem to lack knowledge of the importance of hygiene sanitation of snacks, this can be seen from the lack of children's attention in choosing sanitation of peddlers, where all peddlers are seen directly holding food signs using gloves, snacks that are left open and the like. This is thought to be the basis for finding a relationship between knowledge and children's snacking habits (Rosita et al., 2023).

Hand washing with soap is one of the efforts that can be done to prevent various diseases in an easy and inexpensive way. Washing hands properly must be done using soap and clean running water. If there is no tap, an alternative is to use a bucket or other container to drain the water (Kemenkes RI, 2020). An important principle related to HWWS is that washing hands with water alone is not enough to kill disease-causing germs. Handwashing with soap and clean running water is the most cost-effective way to protect against infectious diseases. HWWS performed for a minimum of 40-60 seconds and by following all recommended steps is proven to be effective in killing germs. HWWS can be effective when hand washing facilities are available, done at important times, and done in the right way (Kemenkes RI, 2020).

The results of this study are in line with previous research in Jember Regency, where elementary school students in Jember Regency have a fairly high awareness of hand washing, although the media used are less qualified (Purwandari et al., 2013). However, the relationship between handwashing and diarrhea did not show similar results. The results of previous studies also showed a relationship between hand washing and the incidence of diarrhea with a



p value of 0.000 and r 0.792. The better the hand washing, the lower the incidence of diarrhea (Purwandari et al., 2013). According to the researcher's assumption, other factors can influence the incidence of diarrhea. The use of cutlery or food packaging can avoid direct contact between hands and food so that food is not contaminated with germs on the hands.

School snacks eating behavior that was assessed included the selection of snacks and the frequency of buying school snacks food. The results of this study indicate that there is a relationship between school snacks eating behavior and the incidence of diarrhea. The results of this study are in line with previous research which obtained statistical test results p value = 0.01. It can be concluded that there is a relationship between snacks consumption behavior and the incidence of diarrhea at SD Negeri 141 Pekanbaru (Dyna et al., 2018). The snack food consumption behavior of respondents who still eat a lot of open snacks and lack of hygiene is due to a lack of knowledge and supervision about safe food processing (Dyna et al., 2018).

Cheap and attractive school snacks will increase students' interest in buying school snacks at school and outside school. Basically, school children like snacks compared to heavy meals. The habit of snacking on food at school is not always caused by the fact that students have not had breakfast/not bringing lunch from home. This is based on the results of research showing that almost all respondents (98.5%) have the habit of buying snacks at school every day, with the highest frequency twice a day (58.8%) (Aini, 2019).

The results of this study indicate an association between E.coli contamination and the incidence of diarrhea. These results are in line with previous research which shows the results of 10 samples of snacks examined, there are 2 (20%) that exceed the threshold set based on SNI 7388 of 2009 concerning the maximum limit of microbial contamination in food, namely <3.0 APM/gr for processed meat-based food samples and <3.0 APM/ml for syrup-type beverage samples. This indicates that the snacks are not suitable for consumption so it is expected to be careful or cautious (Utama, 2022).

This condition may occur because food handlers, in this case street vendors, do not have adequate knowledge of the principles of food/beverage sanitation and hygiene. In addition, street vendors generally sell on the side of the highway in an open state (without a cover), allowing bacterial contamination from the air or dust containing biological contaminants or pathogenic microbes such as *Escherichia coli* which will later reach the food and thrive until it can have an adverse health impact on students who consume it (Utama, 2022).

4. CONCLUSION

Based on the results of data analysis, it can be concluded that there is no relationship between hand washing and diarrhea in elementary school students. There is a relationship between the habit of eating snacks and consumption of school snacks containing E.coli with the incidence of diarrhea in elementary school students.

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