



## STAPHYLOCOCCUS AUREUS CONTAMINANT OF MEAT BASED FOOD STREET ON SALE AROUND ELEMENTARY SCHOOL

<sup>1</sup>Sri Handayani, <sup>2</sup>Sri Sat Titi Hamranani

<sup>1</sup>SI Keperawatan, STIKES Muhammadiyah Klaten; e-mail: stikesmukla@yahoo.com

<sup>2</sup>SI Keperawatan, STIKES Muhammadiyah Klaten

### ABSTRACT

**Background:** Eating is needed by body to gain enough nutrients for our life, recovery, energy at doing activities, growth and development. Nutritious foods are important for students in order to improve the quality of human resources. Applicable intervention to provide nutritious foods for them is by giving attention to their snacks. Snacks for students may give high contribution at providing nutrients for them, on the other hand snacks may also have a high-risk of biologically or chemically contaminated which lead them to have health problems. **Methods:** The research method was comparative used cross sectional study. The research measured *Staphylococcus aureus* contaminant of food street, behaviour of merchant, tableware and food presentation. The sampling method was purposive sampling by taking samples from different merchants. The samples size were 21 samples consisting of cilok, sausage and nuggets. Methods of data collection was interview, observation and laboratory examination. **Results:** The results showed : cilok, sausage, and nugget were contaminated by *staphylococcus aureus* with the percentage of 100%, 70% and 88% respectively. The unhygienic behavior of the merchants, tableware and food serving created a high risk of food contamination. **Conclusions:** factors which related to the contamination of *Staphylococcus aureus* in cilok, sausage, and nugget were the behavior of the merchants, tableware, and food serving.

**Keywords:** *Staphylococcus aureus*, meat based street food, contaminant

### INTRODUCTION

Foods are the basic needs of human being which are needed for growth and development. Elementary school children are in the developmental age, thus need quality nutrients. Nutrient needs can be fulfilled through snacks. Nutritious foods are important for students in order to improve the quality of human resources. Applicable intervention to provide nutritious foods for them is by giving attention to their snacks.

Snacks for students might give high contribution at providing nutrients for them. According to Nuryanto (2008), snacks give contribution to the amount of

energy for about 36%, protein 29%, and iron 52%. Snacks might also have a high-risk of biologically or chemically contaminated which lead them to have health problems. Handayani, Sri and Agustina, Nur Wulan (2017) found that 20% cilok which were sold at the primary schools contained borax.

Out break or Kejadian Luar Biasa (KLB) related to food poisoning occurred in 2013 were 48 cases from 34 province. The numbers of people who were poisoned were 6,926 with the number of Attack Rate (AR) 24.40% (1,690 cases) and the number of Case Fatality Rate (CFR) 0.71% (12 cases) (BPOM RI, 2013). Out



break or Kejadian Luar Biasa (KLB) related to food poisoning occurred in 2014 were 47 cases from 34 province. The numbers of people who were poisoned were 440,000 with the number of attack rate 42.5% and CFR 0.53%. (BPOM, 2014). The number of out break related to food poisoning in Central Java in 2013 were 17, with the number of people who were poisoned were 4.935 orang with AR 19.30% (952 cases) and CFR 0.1% (1 cases) (BPOM RI, 2013).

KLB related to food poisoning in Indonesia were 65.98% caused by microbe, 17.02% from chemical substances and 17.02% from unknown cause. The kinds of food which caused KLB were 36.17% from home cooking, 27.66% from catering, 10.64% from fast foods and 25.53% from snacks (BPOM, 2014). Foods with low-level of acid such as meat are the main cause of infection and microbe-poisoned in general. The kinds of meat based food which are sold in the primary school are nugget, meatball, and cilok.

Meat is a good medium for the growth of microbes because it contains a high level of waters and nutrients such as protein, fat, vitamin, carbohydrate, and exact pH for microbes. One of microbes which easily contaminate meats is *Staphylococcus aureus* (Direktorat Bina Gizi, 2011). Research conducted by Ni Putu Niti Rahayu, Retno Kawuri, Ni Luh Suriani (2014) revealed that the amount of *Staphylococcus aureus* in traditional sausage which were sold in Denpasar were greater than National Standard of Indonesia or Standar Nasional Indonesia (SNI).

*Staphylococcus aureus* is the kind of bacteria which cause food intoxication as

the cause of gastroenteritis after consuming enterotoxin-contained foods with the symptoms of great cramps and vomiting (BSN, 2009). *Staphylococcus aureus* are not resistant to the cooking temperature but its toxic are still resistant to it. Toxic which are produced by *Staphylococcus aureus* will not cause any change to the physical appearance of the foods including its colour, texture, aroma, or taste (Karen and Songer 2005). The Bacteria can be found anywhere such as in the air, dust, waste water, water, milk, foods and cutlery, environment, human being, and animals (Chotiah, 2009).

## METHODS

The research method was comparative used cross sectional study. The independent variables were food merchant, tableware and food serving, and the dependent one was contamination of *staphylococcus aureus*. The sampling method was purposive sampling by taking samples from different merchants. The samples size were 21 samples consisting of cilok, sausage and nuggets. Methods of data collection was interview, observation and laboratory examination. Interview and observation were used to measure behavior of the handler, tableware and food serving. Laboratory examination was used to measure *Staphylococcus aureus* contaminant of samples. The data were then analyzed using Chi-Square test by  $\alpha$  (5%)

## RESULTS

Based on the research result, we had 21 samples which were consisted of cilok merchant, sausage merchant, and nugget merchant. The illustration of the samples

based on the kind of foods is shown at the image below:

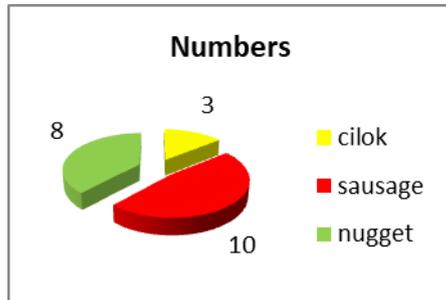


Image 1. The Graph of Sample Distribution Based on The Kind of Foods

The illustration of Staphylococcus aureus contamination based on the kind of foods is shown at the image 2 below:

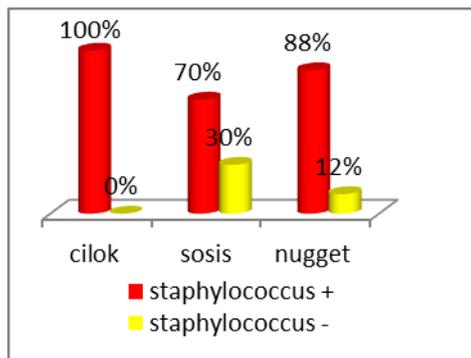


Image 2. The Graph of Staphylococcus based on the Kind of Samples

The behavior of the merchants in this study was measured based on some aspect such as smoking/talking while touching the foods, washing hands before touching the foods, and the hygiene of nails and hands while preparing foods. The behavior of merchants were then categorized into group, which then called as hygienic and unhygienic. The illustration of merchants' behavior is then shown by the image 3 below:

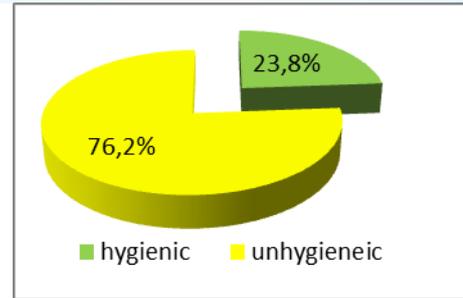


Image 3. The Graph of behaviour merchants

The aspect of tableware in this study were measured from the hygiene of the equipments which then categorized as clean and dirty. The illustration of equipments used by the merchants is shown at the image below:

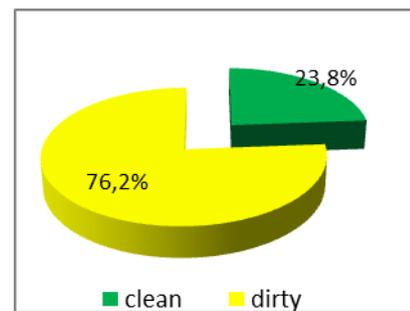


Image 4. The Graph of Tableware's Hygiene

Food serving was measured by the aspect of food cover usage, the absence of flies, and the material of food wrapper. The food serving is categorized as at risk and no risk of contamination. Its illustration is shown below:

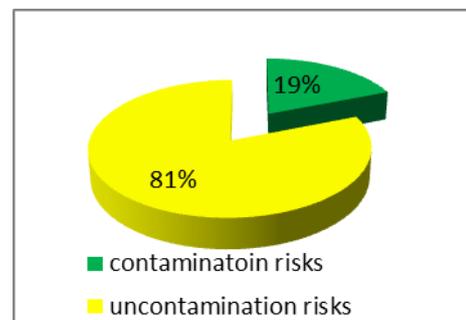


Image 5. The Graph of Food Serving

The result of chi-square between the behavior of merchant, the equipments used, and food serving with *Staphylococcus aureus* contamination in the meaty snack showed the number of  $p <$

$\alpha (0,05)$  which means the merchants' behavior, equipment used, and food serving were related to *Staphylococcus aureus* contamination in meaty snacks.

Table 1. Summary of statistic result by merchants behavior, tableware, food serving with *Staphylococcus aureus* contaminant

Independent Variable	Dependent Variable		P(value)
	(+) <i>S. Aureus</i>	(-) <i>S. Aureus</i>	
1. Merchants' behavior			0,001
- Unhygienic	16(100%)	0(0%)	
- Hygienic	1(20%)	4(80%)	
	17(81%)	4(19%)	
2. Tableware			0,028
- Dirty	15(93,8%)	1(6,2%)	
- Clean	2(40%)	3(60%)	
	17(81%)	4(19%)	
3. Food Serving			0,012
- At risk	16(94,1%)	1(5,9%)	
- No risk	1(25%)	3(75%)	
	17(81%)	4(19%)	

## DISCUSSION

The result of the study revealed that 81% of 21 samples which consisted of cilok, sausage, and nugget were contaminated to *Staphylococcus aureus*. It might be caused by the water contamination, tableware, dirty, air, and the behavior of merchants. The analytical result of the behavior of merchants, tableware used, and food serving with *Staphylococcus aureus* contamination showed the number of  $P < 0,05$ , which means the merchants' behavior, tableware used, and food serving were related to *Staphylococcus aureus* contamination in meaty snacks.

*Staphylococcus aureus* are not resistant to the cooking temperature but its toxic are still resistant to it. Toxic which are produced by *Staphylococcus aureus* will not cause any change to the physical appearance of the foods including its colour, texture, aroma, or taste (Karen and

Songer 2005). The Bacteria can be found anywhere such as in the air, dust, waste water, water, milk, foods and cutlery, environment, human being, and animals (Chotiah, 2009).

*Staphylococcus aureus* contamination in this study was caused by the unhygienic behavior of merchants. The merchants were also smoking or talking while touching the foods or snacks which could cause droplet sprinkling to the snacks and contamination. According to Depkes RI (2001) the smoking habit at the food processing environment has high risk for health such as the bacteria from the mouth could be easily moved to our hands and foods, the ashes from cigarette could be easily fall to the foods and cause air contamination.

Besides, based on the research observation result, the merchants had long-nailed hands (43%), dirty-nailed (57%) and did not wash their hands before



touching the foods (95%). The dirty nails and not washing hands before touching the foods were the main cause of food contamination. Microorganism from foods would easily move to the foods and would reproduce themselves in the foods.

The *Staphylococcus aureus* contamination in this study might also caused by the uncovered food serving. Based on the research observation, about 62% of merchants did not cover their foods, 81% of the foods were surrounded by the flies, and about 76% of the foods were covered by scrap papper. Letting the foods uncovered will make the risk of contamination higher as the pollution from the environment can easily touch the foods.

The usage of scrap papper for covering the foods were lately known contained much Pb or more than what had been standarized. There were so many foods which were covered by scrap pappers because the merchants had limited knowledge of it, whereas it is dangerous as hot materials would make the Pb move to the foods easier (Jaringan Informasi Pangan dan Gizi, 2008). According Suwaidah, Lis Siti., Achyadi, Nana Sutisna and Cahyadi, Wisnu (2014) lead was present in newspaper and magazine because it was present in printing ink. The effect of toxic lead is mainly on the brain and central nervous system. As a result of lead poisoning is a central nervous system disorder, gastrointestinal tract and can also anemia. The use of black plastic bags are mostly recycled products that are often used to accommodate food. Recycling process the history of prior use is not known, whether the pesticide container, hospital waste, animal or human waste, heavy metal waste and others. The process

also added a variety of chemicals that more risk to the health impact (BPOM RI, 2009).

The result of this study was relevant to research which was conducted by Nurwafiah Marda, Saifuddin Sirajuddin, Ulfah Najamuddin (2014) which revealed that boiled meatball and nugget which were sold at SD Kompleks Lariangbangi Makasar were contaminated to high level of *Staphylococcus*. This research were also relevant to Hardianti Fitrisari (2010) which revealed that otak-otak which were sold at Bandar lampung traditional market were contaminated to *Staphylococcus aureus*.

## CONCLUSION

Based on the research result, we can conclude that cilok, sausage, and nugget, which are sold in the primary school at Central Klaten were contaminated to *Staphylococcus aureus*. Some other factors which were related to *Staphylococcus aureus* contamination were the merchants' behavior, tableware, and food serving.

## REFERENCES

- Ariyani, D. dan Anwar, F. (2009). Mutu mikrobiologis minuman jajanan di sekolah dasar wilayah Bogor Tengah. *Jurnal Gizi dan Pangan*, 1 (1): 44-50. Respiratory.ipb.ac.id
- Badan Pengawas Obat Dan Makanan Republik Indonesia. (2008). *Jenis Bahan Kemasan Plastik*, Buletin Keamanan Pangan 14 : 14-15
- BPOM RI. (2013). *Laporan Tahunan 2013 Badan Pengawas Obat dan Makanan RI*. Jakarta: BPOM RI.
- BPOM RI. (2014). *Laporan Tahunan 2014 Badan Pengawas Obat dan Makanan RI*. Jakarta: BPOM RI.



- BSN. (2009). *Standar Nasional Indonesia 7388 : Kajian Keamanan Cemaran Mikroba*. Badan Standarisasi Nasional. Jakarta : 29–33.
- Chotiah, S.(2009). Cemaran *Staphylococcus aureus* Pada Daging Ayam Dan Olahannya. Balai Besar Penelitian Veteriner. *Seminar Nasional Teknologi Peternakan dan Veteriner*: 682-687
- Creswell, J. W. (2013). *Research Design Pendekatan Kualitatif, Kuantitatif, dan Mixed*. Yogyakarta: Pustaka Pelajar.
- Depkes RI. (2000), *Prinsip-Prinsip Hygiene dan Sanitasi Makanan*, Departemen Kesehatan Republik Indonesia, Jakarta
- Fathonah, S. (2005). *Higiene dan Sanitasi Makanan*. Fakultas Teknik Universitas Negeri Semarang. Semarang
- Handayani, Sri. dan Kurniawati, Y.O. (20) *Analisis faktor yang mempengaruhi pedagang makanan jajanan dalam pemakaian pewarna sintesis berbahaya di lingkungan sekolah dasar kecamatan Klaten Tengah*. *Jurnal* <http://ejournal.stikesmukla.ac.id/index.php/motor/article/view/114>
- Handayani, Sri dan Agustina, Nur Wulan. (2017). *Cemaran Boraks pada Cilok yang Dijual di Lingkungan Sekolah Dasar*. **URECOL**, [S.l.], sep. 2017. Available at: <http://journal.ummg.ac.id/index.php/urecol/article/view/1082>. Date accessed: 05 oct. 2017
- Hardianti Fitriani. (2017). *Survey Cemaran Bakteri Salmonella sp., Escherichia coli dan Staphylococcus Aureus Pada Otak Otak Ikan di Pasar Tradisional di Bandar Lampung*. Skripsi. <http://digilib.unila.ac.id/28242/3/SKRI%20TANPA%20BAB%20PEMB%20AHASAN.pdf> diAkses Ju'mat 6 Oktober 2017 jam 13.50
- Hidayat, H.A. (2010). *Hubungan Pengetahuan dan Praktik Penjamah Makanan Mengenai Higiene Sanitasi Makanan dengan Keberadaan Escherichia coli Pada Nasi Rames* (Studi Pada Kantin di Lingkungan Universitas Diponegoro Tembalang). FKM Undip (online) (<http://http://eprints.undip.ac.id/17259/> diakses tanggal 1 April 2016)
- Karen W.P and Songer G.J. (2005). *Veterinary Microbiology*. London: Elsevier saunders
- Kementrian Kesehatan Republik Indoneasisa *No 1096/Menkes/per/VI/2011* tentang Hygiene Sanitasi Jasa Boga Keputusan Menteri Kesehatan Republik Indonesia *Nomor 942/Menkes/SK/VII/2003* tentang Pedoman Persyaratan Hygiene Sanitasi Makanan Jajanan, Depkes RI.
- Kusnoputranto. (2009). *Sanitasi Makanan Jajanan Anak Sekolah Memprihatinkan*. <http://www.bpom.com>. (access: 9 April 2016).
- Kusmayadi, Ayi dan Dadang Sukandar. (2007). *Cara Memilih dan Mengolah makanan untuk Perbaikan Gizi Masyarakat* [on line]. Special Programme For food Security: Asia Indonesia, dari [webmaster@deptan.go.id](mailto:webmaster@deptan.go.id). Diakses [12 Desember 2015]
- Lues JF, Rasephel MR, Venter P, dan Theron MM. (2006). *Assessing food safety and associated food handling*



- practices in street food vending. Int. J. Environ Health.* 16(5): 319-328. DOI: 10.1080/09603120600869141.
- Melliawati, R. 2009. *Escherichia Coli Dalam Kehidupan Manusia*, Biotrends/Vol.4/No.1/Tahun 2009 (Diakses 2 April 2016)
- Ni Putu Niti Rahayu, Retno Kawuri, Ni Luh Suriani (2014) Uji Keberadaan *Staphylococcus aureus* Pada Sosis Tradisional (Urutan) Yang Beredar Di Psar Tradisional Di Denpasar, Bali . *Jurnal Simbiosis II* (1): 147- 157 ISSN: 2337-7224 *Jurusan Biologi FMIPA Universitas Udayana* Maret 2014  
<https://ojs.unud.ac.id/index.php/simbiosis/article/view/9497/7000> 3 oktober 2017 11.42
- Nurwafiah Marda, Saifuddin Sirajuddin, Ulfah Najamuddin (2014) *Analisis Mutu Mikrobiologis Pada Pangan Jajanan Anak di SD Kompleks Lariangbangi Makasar*  
<http://repository.unhas.ac.id/bitstream/handle/123456789/10513/Nurafiah%20Marda%20K21110271.pdf;sequence=1> di Akses Ju'mat 6 Oktober 2017 jam 13.40
- Nuryanto. (2008). Bahaya makanan jajanan. Dalam: *Bunga rampai topik gizi. Edisi 1*.Semarang:Badan Penerbit UNDIP
- Rahayu, W dkk. (2011). *Keamanan Pangan : Kepedulian Kita Bersama*. Bogor : IPB Press
- Rhen M, Maskell D, Mastroeni P, (2007). Threllfall J Salmonela : *Molecular Biology and Phatogenesis*. Horoson Bioscience : UK.
- Suwaidah, Lis Siti., Achyadi, Nana Sutisna and Cahyadi, Wisnu (2014). Kajian Cemaran Logam Berat Timbal Dari Kemasan Kertas Bekas Ke Dalam Makanan Gorengan. *Panel Gizi Makan* Vol 37 (2): 145-154. Desember 2014