Prosiding Personal Hygiene

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Personal Hygiene as The Dominant Factor of Most Probable Number of Bacteria Coloni on Cutlery in High School Cafetaria in Jambi City 2015

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.-fbsrracr-Cullcrr is one of factor that plays a role in dis ɯse transmission, because Ihe dirty cutlery contains microorganisms can transmit Ihe disease. The aim of this study was determine the relationship of personal hygiene, water quality, "ashing techniques and storage of equipment lo the number of bacteria on cutlery 0f cafeteria in high school in Jambi city. The study was a cross sectional, conducted in August lo October 20lS al gorɯrnmenl high school throughout Ihe city of Jambi among S0 cafetarias at Ihe eleven high school taken by proportional random sampling. The independent variables were personal hygiene, water quality, washing techniques and storage of equipment. The dependent variable was the number of bacteria. Number of bacteria examined by Plate Count Agar method and double tube of the Most Probable Number. Bacteriological examination of water by a row of test tubes chat fostered the growth of coliform. The data collection was observation using a checklist. Statistical analysis were using chi square and multiple logistic regression. The result showed Ihai 50% of personal hygiene of food handlers unfavorable, 30% water quality wasn't good, 23% poor eating utensils washing techniques and 21% poor equipment storage. There were 38% cutlery with the number of bacteria > l00 colonies/cm^2• There were relationship between personal hygiene (OR = 7:667; 95% CI = 1.47 to 39.99), water quality (OR = 7.36; 95% CI= 1.67 to 32.44), washing technique (OR = 7.36; 95°!. CI = 1.19 to 32.08) with the number of bacteria on dinnerware. There was no relation between feeding equipment storage area to number of bacteria on cutlery (OR= 0.65; 95% CI = 0.18 to 2.41). The dominant factor was a personal hygiene OR= 6.171 (95% CI =0.094 to34.820). The necessary supervision, counseling and training from the City Health Office of Jambl to food handlers in the high school cafetaria so the food vendors can implement food sanitation hygiene in daily practise.

Keywords: h)'gicne, water quality, washing, number of bacteria, cutlery.

I. INTRODUCTION

According to H L. Blum quoted by Kusnoputranto (l986: 23), that health status is influenced by four factors: heredity, health, behavior and environment. Among those factors, essentially environment is a condition or an optimal environmental state that has a positive effect and plays an important role towards the realization of optimum health status. The big environmental influence on public health needs to be done through the efforts of environmental health. One of the efforts is monitoring public places and food hygiene including the improvement of food sanitation in the processing place of foods and beverages that sell providing services of food for the public (Anwar,dkk, l987:39).

Cutlery is one of factor that plays a role in disease transmission, because the dirty cutlery contains microorganisms can transmit the disease through the foods, ◆ that the process of washing cutlery with application of washing method is very important.

The hygiene level of food consumed is influenced by several factors, for example in processing, storage;' transportation and serving until washing the cutlery. Water that is used for washing cutlery physically like its odor, Caste, color and the number of bacteria according the regulation of Ministry of Health No. 416 / Menkes / Per / IX / l990, about the requirement of clean water. While the cutlery requirements are regulated in the Ministry of Health No. 715 / Menkes / SK IV/ 2003 that the cutlery requirements must not contain more than 100 bacterial colonies / cm' surface.

The cutlery cleanliness is very important and affects the quality of food and beverages. The dirty cutlery can be a breeding ground of organisms or germs and contaminate the foods. All of the cutleries which are possible to contact With the, foods need to be always in

clean condition and no leftovers on them. If it is happened, it will he a chance for bacteria in breeding and decomposing the food (Pumawijayanti, 2001:40).

The dirty cutleries have an important role as a breeding ground for the bacteria and poisonous.

So the cleanliness of the cutlery should always be kept in order avoid contamination of pathogenic bacteria such a, Escherichia coli and other contaminants.

The contamination food of the microbes can be from: the environment, raw materials, water, cutlery. and contacted people from the food processing, start from raw materials until it is ready to serve. The food vendor hygiene factor or food clerk is most popular called as personal hygiene should he appropriate with the procedures in maintaining the cleanliness when doing the food processing, so the food will be safe and sound (Chandra, 2007: 12).

The procedure in maintaining the cleanliness is a clean attitude to prevent the food contamination. The important procedure for the food vendor is washing their hands, the cleanliness and health of themselves. But most of infected food vendors may be not aware that they bring the pathogenic bacteria in their colon because they do not feel bad or not showing the symptoms (carrier). The other factors are like the behavior in processing the food traditionally, storage and serving the food not in clean and not fulfilling the sanitary requirements (Chandra, 2007:14).

That the process of soaking cutlery and washing by using a system of three tubs were able lo reduce the content of bacteriological Reviewed cutlery, energy processing highly educated, no relation to the management of food and drinks. while the use of rings, power processing using long nails and washing process with 3 t,ath not related to the bacteriological quality tableware Cahyaningsih (2009:5).

II. METHODS

This study used a quantitative approach that was more emphasis on the objective measurement to social phenomena. To be able to perform measurements, every social phenomenon was translated into several components of the problem, variables and indicators. Each determining variable was measured in giving the different symbols according to the category of information related into these variables. This type of research was observational with cross sectional design.

The research was conducted in August to October 2015 in the cafeterias at government high school throughout the city of Jambi.

The study population was a food vendor in the cafeteria at government high school throughout the city of Jambi, 104 [ood vendors of 11(ckvcn) government high schools in the city of Jamhi, total cafeterias of government high schools in the city of Iambi. The amount of taking sample was 50 food vendors in the cafeteria of government high schools in the city of Iambi or 48% of the total population.

Methods of data collection for personal hygiene variable, washing techniques, and storage of equipment was using observation sheet (checklist) based on the development or food and beverage sanitary hooks on sanitation education institutions (Anwar, 1997: 24) Pusdiknakes RI. The inspection of water quality physically and laboratory was based on Permenkes No. 416 of 1990, while the laboratory inspection of the bacteria in the water and the number of bacteria in the cutlery was done. Standard Operating Procedure (SOP) in wipe sampling of Ine cutlery and laboratory

Secondary data was collected from various sources such as from Iambi 'City Health Office about the number of people with ptomaine poisoning in the city of Jambi and inspection of basic sanitation. the Department of Education and Culture in Jamhi about total number of the students and the address or the government school in the city of Jambi, and the results of previous research that was closely related to problems studied. The research instrument used in this study was the observation sheet (checklist). Validity and reliability was on the attachment. Validity test was done on 15 food vendors in the 11 (eleven) cafeteria of government high schools in the city of Jambi. For personal hygiene items as many as 15 items of observation. After the test became only 12 items are used. Washing technique as many as 10 items, after the test became only 8 items and storage of cutlery as many as 5 item, after the test became only 4 item observation.

The stages of the study as follows: Data collection which was like observation using a checklist sheet. The author provided guidance or explanation to the enumerators associated the cutleries sampling technique such as plates, spoons, forks, cups and water sampling. The samples of the cutlery was inspected in the Health Analysis laboratory in the city of Jambi, so do a bacteriological examination of water samples which was done in the Health Analysis laboratory in the city of Jambi.

Data analysi« method was l0 analyze the rcl.rtionxhip. The sl.lgcs were univariate analysis. hivariutc ;ln;ily,is and multivarinU· Jn.ilysis.

III. Rl::SULT

Based on the results of the study in government high school in the city of Jambi consisting of S0 food vendors. characterizing of food vendors that included gender. education, age and length of working

Table 1. The characteristics of food vendors in the cafeterias at government high school in the city of Jamhi

No.	n c◆ ◆rbticof foodvudors	F	%
1.	(icndcT		
	- Mak	4j	IX
	- Icmalc	-11	I2
2.	l:du◆ari.,n		
	- Iligh	19	3X
	- l.ow	31	62
3.	Age		
	< -l0 Y<lls	l5	30
	> J0 Years	35	70
4.	Length nf working		
	< l0 Yea,◆	-18	96
	> l0 Years	2	-l

The characteristics of food vendors based on gender in the cafeteria at government school in the city of lambi mostly was women at 41 (82%), based on the education mostly was a low educated as 31 (62%), based on the age mostly was more than 40 years as many as 35 (70%), and based on years of working was mostly less than l0 years were 48 (96%).

Table 2. The research based on Variable Frequency Distribution in the cafeterias at government high school in the city of Jambi.

No.	Variables of research	F	%
1.	Personal Hygiene		
	- Unfavorable	25	50.0
	- Favorable	25	50.0
2.	Water Quality		
	- Not good	30	60.0
	- Good	20	40.0
3.	Washing techniques		
	- poor	23	46.0
	- rich	27	54.0
4.	Storage of the equipments		
	- Poor	21	42.0
	- Rich	29	58.0
5.	The number of bacteria on cutlery		
	- N,,r<-◆◆l	;x	7h.U
	- <i,◆,J	l2	◆1.0

The frequency distribution of personal hygiene of food vendors in the calètcria high schools in the city of Jarnbi is s.llle hl'l'' ecn the favorable personal hygiene 50% with unfavorable personal hygiene 50.0%. The quality of water used in the cafeteria of high schools in the city of lambi based on the results of laboratory tests was not good and unqualified as 60%. The rich washing techniques performed by food vendors in the cafeteria high schools in the city of lambi is a good deal that is as much as 54.0%. The rich storage of cutlery of the food vendors in the cafeteria high schools in the city of Jamhi most with good criterion that was as much as 58.0%. Re◆lllt of laboratory tests that the numher of bacteria on the cutlery in the cafeteria high schools in the city of Jambi was mostly not good and unqualified as many as 76.0%.

Table 3. Relationship Analysis of Research Variables with Bacteria On the cutlery in cafeteria high schools in the city of Jarnbi,

◆◆le.of iR◆h	The ◆umbcro f Bll\ctcriaon thl: 6utletF				O◆	P: Va/ue
	UDQUl.)ilicd		Quall.lied			
	N	••	N	%		
Personal llyglm•						
- Unfavorable	◆)	92.0	2	8.0	7,67	*0,01*
- Favorable	l5	60,0	l0	-10.0		
Wat,r Quality						
- Nol Good	27	90.0	3	l0.0	7.4	0,007
- Good	11	55.0	9	45.0		
Washing t,chni9u•s						
- Poor	21	91.3	2	8.7	6.2	0.045
- Rich	17	63.0	10	37,0		
Storage of The Equipments						
- Poor	15	71,4	6	28,6	0.65	0,758
- Rich	23	79,3	6	20,7		

The analysis results of relationship between personal hygiene with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Jambi that there were 25 food vendors with poor personal hygiene, obtained 23 (92.0%). 25 Food vendors were not eligible number of bacteria on the cutlery. Food vendors with good personal hygiene obtained 15 (60%) food vendors were not eligible number of bacteria on the cutlery. Statistical test results obtained Chi-square p-value = 0.020 ($p < 0.05$),

it could he concluded that statistically there was a xigni licant relationship between personal hygiene with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Iambi.

The analysis results of relationship between the water qualities with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Iambi that there were 30 water quality not good in the cafeteria SMA Iambi City, obtained a total of 27 (90.0%) which were not eligible number of bacteria on the cutlery, and there were 20 water quality good and qualified. obtained 11 (55.0%) which were not eligible number of bacteria on the cutlery. Statistical test results obtained Chi-square p-value = 0.007 ($p < 0.05$), it could be concluded that statistically there was a significant relationship between water quality with the number of bacteria on the cutlery in the cafeteria al government high school in the city of Jambi.

The analysis results of relationship between the washing techniques with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Jambi that there were some 23 food vendors with poor washing techniques, gained as much as 21 (91.3%) who were not eligible number of bacteria on the cutlery and 27 food vendors did a good washing techniques, obtained by 17 (63.0%) who were not eligible number of bacteria on dinnerware. Statistical test results obtained Chi-square p-value = 0.045 ($p < 0.05$), it could be concluded that statistically there was a significant correlation between washing technique with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Jambi.

The analysis results of relationship between the storage of equipments with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Jambi that there wrre 21 cafeterias not good in storage of equipments. gained as much as 15 (71.4%) who were not eligible number of bacteria on the cutlery and 29 cafeterias with good category in storage of equipments. gained as much as 23 (79.3%) who were not eligible number of bacteria on cutlery. Statistical test results obtained Chi-square p-value = 0.758 ($p > 0.05$), it could be concluded that there was no statistically significant relationship between the storage of cutlery with the number of bacteria on the cutlery in the cafeteria at government high school in the city of Jambi.

The analysis result of double regression logistic multivariate between the washing techniques, water quality, and personal hygiene with the number of bacteria on the cutlery in the table below:

Table 4. The analysis result of double regression logistic multivariate between the washing techniques, water quality, and personal hygiene with the number of bacteria on the cutlery

Analylli	8	Ï Wïld	OR	95 'II, CI
t.oi:litk R11:rrulon !\I ult! url•lf between V1rl1blcl				
• l',-s.>nal hn:icnc:	1,77	0,0I>	5,l!57	0,'17,)S,5}
• Water Qualily	1.75	0.[illegible]	5,757	l.l-1.111.10
• Washing Techniques	1.-17	0,11	..u1,1,	U,f>'l.17.tU
l.l>)tl•tlc Rcr,[illegible]sslon \tulli\"ariatc 0f The 1.asl i\lot\cb				
• Personal hyi:knc:	1.K2	0,0-l	h,171	1,0"-1,HJ\2
• Walc:dJualily	1.79	0,02	5.9%	1.2M·:?M.S3
• ('on[illegible]lanla	-6,KS	0,00	0,001	

Based on the data above lhat the significance Log-Likeihood <0.05 ($p = 0.001$). But significantly P_Wald on variable unfavorable washing techniques have P_VALUE> 0.05, so it is extremely needed the expenditure on modeling variables. Aller being tested, that good water quality variables and personal hygiene had P_VALUE (Sig) below 0.05, which meant that two variables significantly related to the figure of bacteria on the cutlery.

In the interaction analysis, the selection of variables that interacted between the independent variables was based on the substance. Based on variables in the multivariate model, the possible interaction was the water quality and personal hygiene. The result of interaction that the test showed the omnibus P_VALUE = 0.998 meant greater than 0.05. It indicated that there was no interaction between water quality variables with personal hygiene.

Based on the overall results of the analysis. it could be concluded that from the four independent variables were related to the number of bacteria on cutlery, there were only two significant related to the number of bacteria on cutlery those were personal hygiene and water quality. The analysis result of Logistic Regression Multivariate of The Last Models that Odd Ratio (OR) of personal hygiene variable was 6.171 ((95% Cl: 0094-34820), it meant that personal hygiene variable had the chance of bacteria contamination in the cutlery 6 times higher after the controlled variable water quality. Furthermore, it could be concluded that the greater the value of Exp (B), the greater the effect on the number of bacteria on cutlery. The analysis showed that, personal hygiene variable was the most dominant variable related to the number of bacteria on

the cutlery in thc cafeteria at government high school in the city of Jambi.

I\'. DISCUSSION

The relationship analysis of personal hygiene with number of bacteria on the cutlery in the cafeteria high school in the city of Jambi found that, the food vendors with good personal hygiene highest one was in SMAN 3 and SM AN ! I. Personal hygiene could also lead to the total number of bacteria on cutlery. Therefore, personal hygiene of foo<l vendors was concerned. The evidenced was from the study of 50 cafeterias that there were 38 cafeterias that did not qualify in the canteen SM AN 2 and SM,'\N 7 the city of Iambi. From the results obtained by analysis of the value of OR = 7,6ti7, meaning that the bad personal hygiene of foo<l vendors had the opportunity to 8 times for the number of bacteria on cutlery compared with the good personal hygiene.

Personal hygiene had a relation with the number of bacteria on cutlery means that good personal hygiene will not cause contamination of the cutlery and the food that will not contain bacteria (Yunus, 2015: 210).

Personal hygiene is an effort of public health who studied the effect of environmental conditions on human health so that the resulting efforts to prevent diseases caused by environmental stress of poor health and make good environmental conditions in order to ensure the maintenance: of health, hygiene is the effort of health prevention (preventive) which is more focused on activities individual health or personal health of human life.

E. coli contaminants that personal hygiene variable is the most dominant variable which affects the quality of food and beverages because water is a determining factor (Yunus,. 2015: 210), this is likely said by (Fathonah, 2005: 12) that clean working clothes will ensure sanitation and hygiene food processing because there is no dust or dirt attached to the clothing can indirectly cause pollution to the cutlery.

Food vendors who washed. their hands, from the research that 55% of the food vendors did not wash their hands before handling the food, 67% of food vendors with an apron that used workers were not clean and used as hand Wipes| A total of 50 food vendors, obtained 68% of food vendors did not use tongs when taking food, 67%'0ffood vendors did not use caps or nets hair (hai91ct), and 68% of food vendors each hand touching, scratching. combing, or a hair tie, hand was not immediately washed their hands under running water.

The results were consistent with research conducted by Ilanono and Susanna (2003: 8) stated that 64% of l()(Xl vendors did not use: the tools or clamp while taking or holding potential food contamination. The touch of the hand was the most common cause of food pollution. Microorganisms embedded in the hand will move into food and multiply in food, especially in processed food. In addition, behavior or had habits food vendors might also influence the occurrence of Escherichia coli bacteria contamination in foods or beverages tool.

The biggest of food contamination is the worker. Food vendors who handle food must follow adequate procedures to prevent contamination or bacteria and germs on the: cutlery (Titin Agustina, 2010: 14).

The procedure is important for food vendors who have personal hygiene and good living habits (Fathonah, 2005: 11), like always maintain the cleanliness of hands, always use tongs or tools or holding food when serving food and using apron,

Bacteria can contaminate food through the hair, skin, nails, airway, hands, sneezing, spitting, yawning and coughing, the bad habits were found also on food vendors who made: a habit of having a smoke at work and the tools used to take food in a state unhealthy so the food will become contaminated with microbes, (Department of Health 2010: 34). Ignorance of food vendors in the handling of food and hygienic was caused by the lack of guidance and supervision of the agency (Cahyaningsih, 2009:11). lack of guidance and supervision of the agency, (Cahyaningsih, 2009: 11).

The bad personal hygiene was caused by the food vendors and canteen worker not understand about how important of food quality because of habits and coaching that leads to good behavior such as the requirement of food sanitation related to conditioning food and drink must have rules of behavior and hygiene was good. Personal Hygiene food vendors needed to be learned and applied in food processing to prevent the transmission of infectious diseases through food.

There were several things that must be taken to avoid the bad effect on food and drink, when processing and serving of food to prevent the transmission of infectious diseases, every food vendor must: always wash their hands before handling food, beverages and equipment.

Personal hygiene included all the terms of the employee's (food vendors) personal hygiene. Keeping personal hygiene means keeping clean living habits

and maintaining the cleanliness of the whole body, There arc several things that should he done included washing hands before and after handling food, short and clean nails, always wear a carpus (special hat for chef) or using a headgear. not fumbling the nose while working and do not wipe the face with hands hut using a handkerchief, keep oral hygiene and teeth, do not smoke while preparing food, do not cough facing the food. do not taste the foo<l directly on the cooking appliance, By leaving this bad activity, the contamination of foo<ls can he avoided (Chandra, B. 2006: 9).

The sources of water used by I I schools in the city of Jarnbi were dug wells, artesian wells and PDAM water. Water was observed in this study is the quality of the physical and microbiological. The results of the study that the quality of water coming from the water sources which can cause the number of bacteria in the cutlery. Water supply, not only the quality, its quality must also qualify the applicable standards. So, before it is distributed to the customer needs to be processed and qualify the clean water standards. Ideal clean water should be clear, colorless, tasteless and odorless and contains no pathogens. Water should not be corrosive, no sediment left on the entire distribution network. Basically, this reqbirement is made to prevent the occurrence and spread of water-borne diseases.

The survey results that 12% of street vendors were using PDAM Water such as SMAN 8 and SMA 9. 48% of food vendors were using artesian wells such as SMAN 4, SMAN 6 and SMAN 9. 40% of vendors were using dug wells such as SMAN I, SMAN 2, SMAN 3. SMAN 5, SMAN 7 and SMAN 10. The facilities of the water to wash the cutlery were 70% unqualified such as SMAN 2, SMAN 3, SMAN 7, SMAN 10 and SMAN 11, while 30% of qualifying clean water were SMAN I, SMAN 4, SMAN' 6, SMAN 8 and SMAN 9. Physically, all the water sources in accordance with the parameters those arc colorless, odorless and tasteless.

Based on the study research conducted by Wibawa A. (2008), states that to support the sanitation Hygiene qualified the health at the cafeteria, one of them is the provision of clean water, a source of clean water, shelter and water conditions must physically qualify.

Coli form is a type of bacteria that is commonly used as an indicator of sanitary quality determination of food and water. Coli form itself is not the cause of water-borne diseases, but these bacteria are easily to be cultured and its presence can be used as indicators of other pathogenic organisms such as bacteria, viruses or protozoa which many parasites that lived in the human digestive system and it is contained in feces. Indicator organisms are used because when a person is infected by pathogenic bacteria, the person will excrete indicator organisms millions of times more than the pathogenic organisms. if the level of the presence of indicator organisms is low, the pathogens will he much lower or even none at all (Servais. 2007: 8).

The result is the same with the research conducted by Hartono and Susanna (2003: 7). Water is a factor that determines the quality of the foo<l because the water as a raw material for cooking. wash the food. wash cutlery and cookware. If the water is unqualified. so it might be possible for foo<l and beverages processed even the tools that will be contaminated by pathogenic bacteria. Water quality requirement of the physical parameter is tasteless, odorless and colorless, If the water is contaminated, the impact is not good for health, whereas Escherichia coli infection can occur through water used for washing vegetables, fruits, food and cutlery. The existence of a high number of bacteria correlated with the discovery of pathogens in food. Food contaminated by pathogenic disease has a role in the diseases, one of them is diarrhea.

Based on the research conducted by Supali (2001: 16), that 87.2% of the water used to produce ice on itinerant traders in the city of Semarang was positively contaminated with Escherichia coli. Clean water supply is needed to support the implementation of food handling. The clean water sources used to wash equipments, the physical state of water quality and water quantity to qualify, one of them is a clean water supply.

The clean water is one of the sanitation facilities that must be available. The clean water in the cafeteria should qualify the requirements; one of supporting part is a hygienic behavior of the entire food and beverage management activities. Results of univariate test showed the high unqualified water was 60%, from the observation of water sources used in cafeteria was dug wells, the results of the bivariate test showed that there was a relationship the quality of water with the number of bacteria, the result was P = 0.007 unqualified water could potentially transmit the infectious diseases.

The amount of unqualified water was because the cafeteria mostly using the dug wells as water resources for canteen needs. Shallow dug wells and shallow artesian water was a source of water that easily contaminated because of the condition around the wells was able to be penetrated by the water, so the

pollution will hr into the water.. Contamination on the cutlery can occur because the water is polluted hy unhealthy environment, had in washing and wrong handling thi cutlery after washing. Food and drinks were served with contaminated cutlery with bacteria could cause health problems.

Water pollution problems could he identified in some ways, such as by observation indirectly and directly, Indirect observation was through the complaints from food vendors about smelling water. while the direct observation was through the senses to identify such a had taste and turbidity. It is necessary for monitoring hy a government agency or private, Torok Sutrisno (1991: <5). Water pollution around the cafeteria environment was caused by human activities that could change the water quality. Efforts should be made to reduce the impact or environmental pollution of water caused by humans is to avoid dumping garbage around the neighborhood canteen, then pay attention to the distance of the: building dug to a septic tank with a distance of over 10 meters, the physical condition of the wells should he plastered and have the lip of the well. If those things not considered properly. it will cause pollution of the environment around the cafeteria. This condition will greatly affect the quality of cutlery, if there were no efforts to increase the knowledge of the canteen employee, it will be a problem especially contamination of food, so the relevant agencies need lo provide guidance and oversight.

Analysis of washing techniques with the number of bacteria on the cutlery in the cafeteria SMA Jambi City found that, the most unfavorable category washing techniques were SMAN 2 and SMAN 7, it can affect the number of bacteria on the cutlery, while the most favorable category washing techniques were SMAN 3 and SMAN 7. The washing techniques which observed was in how using running water system, how to separate all the dirt and remnants of food contained in the equipment like on plates, glasses, cutlery and spoons, pouring water over the equipment, inunersion (soaking) to allow infiltration of water into the rest of the food, brushing and dissolve oils and fats such as a liquid or powder detergent, not leaving the marks, rinse with water clean by rubbing by hand or until it feels rough (not smooth), and draining.

The results of this study agreed with Sekarwati (2013: 170, stating that one of the determinant factor of high number of bacteria on the cutlery is bad and not hygienic washing process.

Cutlery is one of the factors that play an important role in transmitting the disease, because the cutlery were not clean and contain infectious microorganisms through food (food-home diseases). Cutlery which contact directly with food that is ready to he served must not contain a number of bacteria that exceed 100 colonies / cm' surface (Health Department. 1()()1: 35).

Sunlight is a liquid detergent containing modified with lemon. Detergent is hydrophobic and hydrophilic. The function of hydrophobic is working off the dirt on the washed cutlery. Hydrophilic serves to remove impurities from the surface or the cutleries, and then avoiding the new blemishes.

The washing techniques of the equipments which were done by the canteen employee not qualified, because they did not use the detergent to wash the equipments. The washing was done with collecting all the dishes in a bucket, cleaning the leftovers by using hand, cutleries were washed by using soap into a bucket, and rinse into the bucket without running water. The use of waler was also very limited in quantity and the water quality used only physically observable that was colorless, tasteless and odorless.

This research was supported by Vitria (2013: 6) stated that in her research, there was a relationship between washing tools, personal hygiene with a number of bacteria. Every time after using, the cutlery should he washed thoroughly with hot water and soap (detergent) as sterilization, using a soft brush and foam, or using the washing and rinsing under running water. For equipments such as spoons, forks, cups and bowls are difficult to clean should be soaked in hot detergent or some rinsing with clean and running water.

The washing techniques, drying and storage equipment shall be eligible to be always clean before use. The left contamination of a bad cleaning process of the equipment will be a medium for microbial growth. In the process of cleaning equipments, water plays an important role, because water has excellent solvent properties. Because of the character, water can be easily dissolved the substance, so affecting the character and quality of the water.

The observation result conducted by researchers that most of canteen employee did not wash the cutlery by using running water, did not do immersion (soaking), not scrubbing the surface of the cutlery, did not do immersion chaloron or detergent and drying with a napkin, this condition will make a bad influence and will be at risk of contamination on the cutlery, the number of germs on the top level of the exposure the contamination of cutlery and food will be polluted.

Bad in washing the cutleries, bad waler sources. the water resources was from the dug wells which not qualify the construction standard and also the had behavior that can lead in an increasing of the numbers of bacteria,

To get good clean water is expected to canteen employees using clean water coming from the processing water like from PDAM. Dug wells which arc located in urban areas and water quality will he easily contaminated because of the distance c10 of the source of contamination to the water sources.

The analysis between storage of the equipments with number of bacteria on the cutlery was found that the conditions of storage of cutlery in 11 schools SMAN Jambi City did not affect the number of bacteria on the cutlery, because a lot of food vendors already had a good storage. Nevertheless from the field observations showed that there was still a canteen that has not implemented storage concept as recommended by the Ministry of Health, the condition will have a bad impact ofeontamination on equipment there.

The equipments need to be covered with the dirty sources, the contamination of vermin, and the storage was made of materials that are not easily corroded or soiled by dust. All equipment in contact with food must be kept dry and clean, the storage room was not humid, protected from sources of fouling vermin contamination.

Based on the research results on the storage of equipment in the cafeteria in the highest good category were SMAN 2 and SMAN *5,* while the most unfavorable category were SMAN 3 and SMAN 6. However, the condition of the cutlery could still allow the fouling, contamination of vermin and not closed properly, this condition could be seen from water dust in its surface.

Number of bacteria in the ♦♦tlery in the cafeteria SMAN in Jambi has no relationship, because most of the canteens have a good storage and free from the dust, insects and other animals. Canteens should protect the cutlery starts from the condition of the material. Good cutlery is a material that does not dissolve in the food, easily washable, and safe to use. Equipment intact, secure, and powerful, the cracked equipment or broken apart could cause accidents and also become a source of the dirt because it would not be washed perfectly.

The bad environment around the storage of the cutlery will affect the pollution. The number of bacteria founded on the cutlery because the food vendors put the cutlery around the place which had a bad sanitation and unclean. This condition would affect the total number of'bactcria that contaminated the cutlery.

To keep good environmental conditions of the cutlery, all equipments in contact with food must he kept in dry and clean, storage space is not humid. protected from the source impurity *t* contamination of vermin. Ideally, the building used for storing cutlery made from good material protected from dirt, unpleasam odors, smoke, dust, and for from the garbage disposal, The building of foo◁ processing (kitchen) should he made or strong materials and clean, and the rooms were free of insects, rodents and other pollutants (Permenkes RI. No. 1098 / Mcnkes/ SK / Vil/ 2003).

The Analysis of dominant factors related with the number of bacteria on the cutlery in cafeteria in SMAN in the city of Jambi. is personal hygiene of food vendors. The observation of the results obtained personal hygiene that greatly affected the number of bacteria on the cutlery from the food vendors who did not always wash their hands before handling food, did not use the cap or mesh hair (hairnet) and whenever their hands touching, scratching, combing, or tying the hair, their hands were not washed with running water.

Food vendors is an important factor in transmitting the disease, in which a person's personal hygiene has a relationship with the transmission of diseases, behavioral unhealthy food vendors would have an impact on the hygiene or food served (Adam 2004: 13). Behavior of food vendors affected on food contamination (Fardiaz, 1997: 15), while the other dominant factor was wash their hands with soap for 10 seconds could kill more than 90% of microbes (Health Department, 2004: 45).

From the four independent variables were related to the number of bacteria on cutlery, there were only iwo significant related to the number of bacteria on cutlery such as the quality of water and personal hygiene. and unqualified water qua\ity could increase the number of bacteria on cutlery.

From the whole process of analysis that had been done, ¶t could be concluded that of the four independent variables were related to the number of bacteria on cutlery, there were only two significant related to the number of bacteria on cutlery such as the quality of water and personal hygiene. Furthermore, it could be concluded that the greater the value of Exp (8) the greater the effect on the variable number of bacteria on cutlery. The analysis showed that, variable personal hygiene is the most dominant variable related to the number of bacteria on the cutlery in the cafeteria in SMAN Iambi City.

Based on interviews obtained from the food vendors that had not received a course of hygiene sanitation of food and beverages hy the relevant agencies about the illlp0rl;illcc of personal hygiene and the quality of water used in the management of clean water. this is due lo ignorance of food vendors on the requirements governing hygiene and sanitation about the food and beverage processing.

To improve the understanding and knowledge of food and beverage vendors in the cafeteria that the quality of food consumed by the public can be implemented properly, so it is necessary needed supervision on personal hygiene and the quality of water used hy the sellers.

V. CONCLUSION

1. There is a relationship between the personal hygiene with the number of germs on the cutlery in the cafeteria SMA Jambi with a P-value of 0.006 and OR = 7.6? with 95% Cl = 1.97 to 39.99.
2. There is a relationship between the water quality with a number of bacteria on the cutlery in the cafeteria SMA Iambi city, with a P-value of 0.004 and OR = 7.36 with 95% Cl= 1.67 to 32.44.

Th,ll the food vendor should make improvements and increasing especially on the personal hygiene such as always washing hands before handling food, hats or hair nets and whenever hands touching, scratching, combing, or tying the hair, the hands should be washed their hands with running water. For water quality should use water sources from piping and washing techniques should use running water when washing cutlery. For storage to avoid contamination were placed in an enclosed place.

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