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Hazard Analysis Critical Control Point (HACCP) in Nutritional Installation of Hasanuddin University Hospital Makassar

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ABSTRACT

Hazard Analysis Critical Control Point (HACCP) is a management system used to protect food from physical, chemical and biological hazards. This study tried to analyze HACCP in foods at the Hospital Nutrition Installation. This research method uses observational design using quantitative and qualitative descriptive analysis. The Monitoring Sheet is used to see the application of HACCP in Nutrition Installation. Laboratory tests are carried out on food and cutlery to study pathogenic bacteria. This research was conducted at the Nutrition Installation of Hasanuddin University Hospital, Makassar. The results showed that from the observations of 18 food handlers there were 9 people (50.0%) who did not wear gloves. 16 people (88.9%) who did not wear masks, and 4 people (22.2%) who did not wear headgear while processing food. For bacterial quality in food and cutlery namely E. coli and Salmonella negative bacteria, the total plate count on food <1CFU / gr and cutlery <1 CFU / cm2. The food menu included in the highest risk category will be consumed by vulnerable populations, namely patients. The critical point is given in the process of sorting, stripping, washing, soaking and boiling the chicken curry menu. This research can be resumed by adding other chemical and microbiological parameters

Keywords: Hazard, Risk, Hazard Analysis Critical Control Point (HACCP), Nutrition Installation.

INTRODUCTION

The hospital is an organized place in providing health services to patients, both basic, specialistic and subspecialistic. [1] One of the hospital facilities and infrastructure that must exist is a Nutrition Installation. Nutritional installation is used in the process of handling patients' food and drinks which includes the procurement of raw materials, storage, processing, and presentation of food and beverages. [2] Food becomes an important element in determining one's health status but is very vulnerable to being contaminated by harmful substances or microbiology which can endanger human health. [3] Therefore, it is very important to know the factors that influence the presence of bacteria in food including places, equipment, personal (people) and food so that efforts can be made to create safe food for consumption (Mallongi, 2016). [4]

In America and Europe thousands of people died as a result of the presence of Salmonella and Shigella bacteria in food (Irianto, 2013). [5] The incidence of food-borne diseases in Indonesia is also fairly high. More than 90% of cases of food poisoning are caused by microbes (Depkes, 2018). [6] In 2016 BPOM recorded 46 incidents of poisoning which were spread throughout Indonesia with a total of 1276 victims and 13 deaths.

The bacteria that often cause poisoning are Salmonella, Escherichia coli, Listeria, Clostridium perfringens, Bacillus aureus, Staphylococcus aureus, and Clostridium botulinum (Hariyadi, 2009). [7] In the study Nurjanah E. coli contamination in the Nutrition Installation of X Hospital in Bandung throughout 2015 - 2017 there have been 9 cases of food contamination. [8] And in a study Tampubolon positive food and beverage samples contained E. coli bacteria with values <1.1 - 1600/100 ml. [9]

Research conducted at RSU A. Makkasau Pare-Pare by Muis obtained the results of bacteriological quality on eating utensils with clean water used in the washing process no one fulfilled the requirements. Plato cutlery obtained 3,624 cabbage / cm2 (morning), 5,048 cabbage / cm2 (afternoon), and 4,261 cabbage / cm2 (night). For dishes, side dishes are obtained as much as 503 cabbage / cm2 (morning), 645 cabbage / cm2 (afternoon), and 691 cabbage / cm2 (night). [10] The research was conducted Suriyanti on 4 samples of cutlery (Plato), namely in Plato A the amount of E. coli was as much as 30 cabbage / cm2, in Plato B as much as 11 cabbage / cm2, in Plato C as much as 70 ca. and in Plato D as much as 120 cabbage / cm2. [11] Where as in the study Nikmah [12] it was found the results of 15 cabbage / cm2 in cutlery samples. In the Zelpina a total of 45 samples were analyzed for the presence of Salmonella bacteria in shredded chicken meat as much as 6.66% (3/45) and there was a relationship between the origin of chicken and the presence of Salmonella Bacteria (p value = 0.022 and CC = 0.577). [13]

Related to microorganisms in food taken from the food handling process, the Environment and its people make food served in hospitals not a chain of disease transmission. [14] Therefore it is necessary to do additional hazard analysis of food products and raw materials and additional materials to determine the risks to biological, chemical and physical hazards. [15] To guarantee that the food consumed by the patient is in good condition, the Nutrition Installation of the Hospital needs to do food hygiene and sanitation; [16] One of the efforts that can be made for hygiene and food protection is carried out by applying the Hazardous Critical Control Points Analysis (HACCP) at the Hospital Nutrition Installation. HACCP guarantees all potential hazards in food ingredients are systematically configured at each processing installation. [17]

MATERIALS AND METHODS

Location and Design of Research

The study was conducted at the Nutrition Installation of Hasanuddin University Hospital, Makassar. The reason for choosing the research location is because the Hospital has not applied HACCP and there is no microbiological examination on food and cutlery.

Population and Sample

The population in the study were patients who consumed food from the Hospital Nutrition Installation. The sample in the study was a menu of food and cutlery used in the Nutrition Installation.

Method of Collecting Data

Primary data was obtained through laboratory tests on the quality of food and cutlery from bacteriological aspects, namely identification of E. coli bacteria and Salmonella bacteria and examination of total plate numbers. The application of HACCP was observed directly by researchers using the observation sheet for the application of HACCP.

Data Analysis

Observational data on food handler personal hygiene were analyzed using the SPSS program. The identification of E. coli bacteria using the IKM / BTKLPP-MKS / 7.2 / 01/44 method and identification of Salmonella bacteria using the IKM / BTKLPP-MKS / 7.2 / 01/45 method and examination of the total plate numbers using the APHA 9215 A and B method, 2012

RESULT

The results of interviews with 18 food handlers showed more than 14 people

(77.8%) and only consisted of 4 people (22.2%) food handlers who were male. Explanation of food is divided into 3 mork shift, morning, afternoon, and evening. The average food handler has worked in a Nutrition Installation >6 years (Table 1)

The observations of 18 food handlers showed that the entire handler came to work using clean and neat work clothes every day. These work clothes are only used when working in Nutrition Installation only. The food handler's nails are clean without any nail polish and excess jewellery worn by food handlers while processing food at the Nutrition Installation. Food handlers routinely wash their hands before and after processing food. However, there are still food handlers who do not use personal protective equipment such as masks, gloves and headgear while working.

Table 1 Distribution Characteristics of Food Handlers

Variabel	Frequency	Percentage
Gender		
Male	4	22,2
Female	14	77,8
Age		
20 – 30	4	22,2
31 – 40	14	77,8
Level of education		
SMA/SMK	10	55,6
D3	2	11,1
S1	6	33,3
Occupation		
Person in charge of food processing	1	5,6
Chef	6	33,3
Chef assistant	3	16,7
Waitress	8	44,4
Work experience		
1 – 5	7	38,9
6 – 10	11	61,1

Table 2. Observation of the Hygiene of Food Handlers

Variabel	YES		NO	
	Frequency	Percentage	Frequency	Percentage
overall				
Clean	18	100		
> 2 stell	18	100		
specifically at work time	18	100		
complete and neat	18	100		
Personal hygiene				
Clean behavior	18	100		
Clean nails without nail polish	18	100		
Excessive use of jewelry			18	100
Food processing				
Wash hands before and after work	18	100		
Using gloves	9	50,0	9	50,0
Using a mask	2	11,1	16	88,9
Use headgear	14	77,8	4	22,2
Use tools (spoons, tongs, etc.) when processing food	18	100		

Table 3 shows the observations of Hazard Analysis Critical Control Points (HACCP) on ingredients to make chicken curry which are served as animal side dishes for lunch. Patients are made using the main ingredients namely chicken meat and spices namely onion, garlic, red chili, candlenut, pepper, orange leaves, bay leaves, turmeric powder, sugar, salt, acid, lemongrass, coconut milk powder, lime juice, cooking oil, and water. This menu is intended for patients in class I, II, and III care rooms. Meals for class 1 are served using trays, for class II they are served using stainless steel containers, and for class III are served using plastic containers. Potential hazards to the materials used must be observed directly so that preventive measures or controls can be taken if there is danger. In processing chicken curry, the potential danger that can be analyzed is the potential for physical hazards including impurities contained in food ingredients. The results of the risk analysis showed that the chicken curry menu was in the highest risk category because it would be consumed by patients whose physical condition was unhealthy and unable to eliminate the danger contained in food. The critical control point in processing the menu of chicken curry is in the process of sorting the ingredients before processing, washing the ingredients, stripping the ingredients (garlic - onion), soaking the chicken to eliminate the smell, and boiling chicken curry. Giving a critical limit at each critical control point can be used as a

monitoring for processing the chicken curry menu.

Table 3. Application of Hazard Analysis Critical Control Point in Nutrition Installation

Ingredients	Potential hazard	Hazard risk category	Critical control point	Critical limit	Monitoring
Chicken meat	Chicken feathers, dirt, smell	IV	Washing (CCP) Sorting (CCP) Immersion (CCP)	There is no dirt and odor	Not according to specification standards
Garlic	onion skin, dust	IV	Sorting (CCP) stripping (CCP) Washing (CCP)	There is no rotten onion, all the onion skin is peeled off	according to specification standards
Red onion	onion skin, dust	IV	Sorting (CCP) stripping (CCP) Washing (CCP)	There is no rotten onion, all the onion skin is peeled off	Not according to specification standards
Red chili pepper	Stalk chili, dirt	IV	Sorting (CCP) Washing (CCP)	There are no rotten chillies and chili stalks	accordingly to specification standards
Candlenut	dirt	IV	Sorting (CCP)	No dirt	according to specification standards
Pepper	dirt	IV	Sorting (CCP)	No dirt	according to specification standards
Lime leaves	dirt	IV	Sorting (CCP) Washing (CCP)	There is no dirt and caterpillars	according to specification standards
Bay leaf	dirt	IV	Sorting (CCP) Washing (CCP)	No dirt	according to specification standards
Turmeric powder	Bacillus careus	IV	No CCP		according to specification standards
Sugar	dirt, ant	IV	No CCP		according to specification standards
Salt	dirt	IV	No CCP		according to specification standards
Acid	gravel	IV	Sorting (CCP) Washing (CCP)	There is no gravel	according to specification standards
Lemongrass	dirt	IV	Sorting (CCP) Washing (CCP)	No dirt	according to specification standards
Coconut milk powder	Mold, Khamir	IV	No CCP		according to specification standards
Lime	Citrus seeds, dirt	IV	Sorting (CCP) Washing (CCP)	Clean	according to specification standards
Cooking oil	Turbid	IV	No CCP		according to specification standards
Water	Hair, E.coli	IV	No CCP		according to specification standards
Chicken curry	Hair and bacteria	IV	Boiling	Boiling temperature of 80^0C 30 minutes	according to specification standards

Table 4. Identification of E. coli and Salmonella Bacteria in Food and Cutlery

Sample	E.coli	Salmonella	Total Plate Figures
Food			
Rice	-	-	<1 CFU/gr
Fried egg	-	-	107 CFU/gr
Tofu woku	-	-	<1 CFU/gr
Corn soup	-	-	<1 CFU/gr
porridge	-	-	<1 CFU/gr
Chicken curry	-	-	<1 CFU/gr
Fried tofu	-	-	<1 CFU/gr
Oyong soup	-	-	<1 CFU/gr
Rice	-	-	<1 CFU/gr
Pallumara fish	-	-	<1 CFU/gr
Tamarind tofu	-	-	<1 CFU/gr
Eggplant spinach vegetable	-	-	<1 CFU/gr
Cutlery			
Plate	-	-	<1 CFU/cm^2
Soup bowl	-	-	<1 CFU/cm^2
Rice spoon	-	-	<1 CFU/cm^2
Plastic basket	-	-	<1 CFU/cm^2
Stainless steel plate	-	-	<1 CFU/cm^2
Cutting board	-	-	8 CFU/ cm^2

Table 4 shows the results of the analysis of the presence of E. coli and Salmonella bacteria in the 12 food menus presented by the Hasanuddin University Nutrition Installation Hospital which are negative for each bacterium and for the total plate number << 1 CFU / gr and for 6 cutlery the presence of bacteria E. coli and Salmonella are also negative with total plate numbers <1 CFU / cm2.

DISCUSSION

The Hazard Analysis Critical Control Point that has been directly observed by researchers on the menu of chicken curry presented by the Nutrition Installation and managed to get a positive result where no E. coli and Salmonella

bacteria were found in food and cutlery. The whole stages of HACCP are also done well by food handlers.

However, monitoring still needs to be done during the food processing process because it is susceptible to contamination between food handlers who lack hygiene with food ingredients or equipment used during food processing. [12] The researcher observed that there was a personal harmony of food handlers, namely clothes worn, physical conditions such as cleanliness of fingernails, not using nail polish and excessive jewellery during food processing, habit of washing hands and using personal protective equipment (gloves, headgear, mask).

From the observations of researchers eating food handlers in clean conditions this is in line with the research of Puspitasari which states that the work clothes used must be ensured clean before food handlers carry out their duties. Dirty clothing has great potential as a source of transmission of diseases, especially bacteria that can be contaminated with food and food if the clothes used are not in accordance with the standards. [18]

Personal protective equipment used is gloves, masks, and headgear. But from the results of direct observation by researchers found food handlers who did not wear gloves, masks and headgear when processing food. Because these habits can give contamination to food. [19] Food handlers were not found wearing masks when handling food. The reason food handlers don't use masks is because they feel unfamiliar and uncomfortable. In addition to masking the habit of covering the head, it is also not done by food handlers. [16] It was explained that hair in food can be a source of patagoons. The habit of scratching, combing, binding or touching the head can increase the risk of food contamination. In line with the study Adam which highlighted the hygiene of individual food handlers as one of the determinants of safe food management for patients. And to maintain individual hygiene, food handlers need to get used to using personal protective equipment during food processing. [20]

Chicken curry menu as one of the animal side dishes served for lunch is dominated by golden yellow and has a distinctive and savory aroma. The main ingredients are chicken and spices used are garlic, onion, red chili, turmeric, candlenut, pepper, bay leaves, lemongrass, tamarind, orange leaves, coconut milk, lime, sugar, water, and cooking oil. This food menu is intended for patients in class I, II, III care rooms. Which is served using trays, stainless steel containers, and plastic containers.

Potential dangers found in chicken curry ingredients can cause illness or injury if not controlled. Prevention or control can be done by sorting materials according to predetermined specifications, washing material with running water until clean, soaking to eliminate odors and boiling to ensure the bacteria in the material has been removed.

In the application of HACCP potential biological / microbiological hazards that arise in food processing include the presence of pathogenic bacteria, molds and yeast. The existence of this microbiology can cause diarrhea or poisoning. The greatest potential for bacterial contamination is found in raw materials such as tofu, chicken, meat, fish and eggs. In addition to biological hazards, there are also chemical hazards, such as in the Trisnaini study, there are nitrate chemicals used as preservatives and dyes in ground meat. Physical hazards can be found in foodstuffs including dirt (sand, gravel, dust, soil), hair, skin, stems, or seeds from food ingredients. [21]

Determination of hazard risk categories found in the ingredients used during the process of making chicken curry. Processing chicken curry is in the danger group A and is the highest risk category because it will be consumed by patients. The most important thing in HACCP is to anticipate hazards and identify critical

control points for prevention of hazards during food processing. Determination of critical control points for the processing of chicken curry is found in the process of sorting the ingredients, stripping the ingredients, washing the material, boiling and soaking.

The critical limit on making chicken curry can guarantee that the food consumed by the patient is safe and leaves no danger to the patient. The critical limit of material sorting ensures that there is no rotten material and no dirt. Stripping guarantees all the skin on the ingredients (garlic, shallots) has been removed. Washing with running water ensures the cleanliness of the materials used. Immersion by using lime can guarantee the loss of odor in chickens and can also suppress bacterial growth due to the acidic nature of the lime. Boiling with a maximum temperature of 1000C for 30 minutes can guarantee the food is cooked and safe for consumption. As in the study Djaja the application of HACCP in the processing of good and correct food is to pay attention to the temperature and time of processing so that it can produce uncontaminated food. [22]

The next step is to monitor to ensure there are no deviations at the critical limit. However, there was a deviation in the onion stripping. There is still skin on the onion so that corrective action is taken by re-peeling the onion skin and washing it with running water. In addition to stripping, there is also a deviation in the chicken washing process so that the chicken must be washed again to remove impurities that are still separated.

The development of bacteria in food is influenced by environmental conditions and temperatures that are suitable for bacteria to grow. The optimal food temperature for bacteria to grow is at a temperature of 370C, and will grow slowly at temperatures less than or more than 370C. However, bacteria will not grow at temperatures of 100C-600C. [23] Patients who consume foods that have potential hazards are a category of high-risk groups because they become a range of infections with weak immune conditions so as to accelerate the patient's healing process. [12]

CONCLUSION AND SUGGESTION

From the results of observations found food handlers who do not use masks, gloves and headgear so as to provide contamination to the food served. However, the bacterial quality of food and cutlery is E. coli and Salmonella negative, total plate counts on food <1CFU / gr and cutlery <1 CFU / cm2. Chicken curry menu is included in the highest risk category because it will be consumed by vulnerable populations, namely patients. The critical control point found in the process of making chicken curry is in the process of sorting, stripping, washing, soaking and boiling the chicken curry menu. This research can be resumed by adding bacterial and chemical parameters to possible food and food ingredients.

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