The Bacterial Quality of Food Served to Patients at Hospitals of Khartoum Locality, Khartoum State, Sudan.

Zienab Ahmed Yousif.[1] and Ali BabikerOsman.[2*]

1-Ministry of Health, Khartoum State. Sudan.
2-Department of Food Safety and Hygiene, Faculty of Public Health, Shendi University, Sudan.

Abstract:

A descriptive cross sectional hospital based study was conducted in 12 hospitals at Khartoum Locality, Khartoum State, Sudan from May2016 to September 2018. The study aimed to determine the level of microbial quality of food prepared and served to patients in the hospitals. A total of 300 food contact surface swabs and 36 of food samples prepared and served to patients were collected for microbiological examination. The microbial growth were detected in (84.7%) of food contact surfaces. *Staph epidermis* were detected in (40%) of food contact surfaces mainly workers hands**,** knives and food utensils*; pseudomonas species* in (48%) mainly benches, food shelves and knives and *Coliform* (12%) from benches and utensils. The bacteriological findings of food prepared and served to patients revealed (52.8%) samples positive for bacterial growth, (68.4%) of these were of APC range 3×10^2-1×10^3, whereas (31.6%)were positive for *Staphylococcus aureus coagulase +ve* with APC range of 3×10 - 3×10^2. This APC were found to be within the limits of the SSMO for acceptable ready to eat food but indicate some hygiene problems. The study recommended the hospitals to endeavor adoption of Hazard Analysis Critical Control Points (HACCP). Such approach will definitely ensure the quality and safety of food served to patients in the hospitals.

Introduction:

Safe food served to patients in hospitals is an essential part of patients care that encourage patients to be well and due to this hospitals have been considered as one of the institutions of high food safety risk since they served food to vulnerable people. Food contamination by pathogens could be particularly harmful. In hospital catering, food services staff is the main food handlers although nurses and other domestic staff may distribute or serve meals. (1). Food handler's staff in hospitals may possibly introduce pathogens into food during every phase from purchase to distribution. (2).

Nosocomial food borne outbreaks in hospitals is attributed to poor hygiene in the system of preparation, distribution of food, and poor personal hygiene of food handlers (3).

The most common causes of food bone infections in hospitals are improper holding time or temperature, contaminated equipments, poor personal hygiene, and food from unsafe sources (4).

The prevention and control can be made through strict implementation of food hygiene and safety systems.The present study aims to determine the level of microbial quality of food served to patients in hospitals of Khartoum Locality, Khartoum State, Sudan.

Materials and Methods:

Three hundred swab samples were taken from the surface area that was in contact to food while processing. From each hospital kitchen 25 swab samples were collected as 5 samples for each of food shelves, benches, food utensils, knives and hands of workers. A total of 36 samples of prepared and served food to patients were collected under aseptic conditions with frequency of 3food samples from each hospital kitchen. Food served to patients is Sudanese traditional meals and were typed as the material sources consistency into: legume based sauces, vegetable based foods and amylaceous. The three samples from each hospital kitchen were taken at breakfast, dinner and supper meals. Each food sample being 100 grams were placed in sterilized plastic bags and kept in ice box during transport to Food and Water Microbiology Department at the National Health Laboratory-Khartoum-Sudan (5). The microbiological methods used were the generalization of statutory tests in Department of Food and Water (6). All food contact surfaces were tested for the presence of bacterial growth and identification of the isolates. On the other side all food samples were tested for the presence of bacterial growth, Aerobic Plate Count, then for detection and enumeration of Aerobic Plate Count for S*taphylococcus aureus Coagulase positive.* Analysis of the bacteriological findings of the food samples used was taken from the microbial safety standards of some international regulations for specific types of foods (7),(8),(9),(10). Ethical clearance was obtained from Khartoum State Ministry of Health. Formal letters was given to each hospital medical director informing the purpose of the study and consent were obtained.

Results:

Table (1); The frequency of isolation of species of bacteria from different types of food contact surfaces (n=60 for each type).

Food contact surface\species of bacteria	Knives	Benches	Shelves	Utensils	Hands
Staphylococcus epidermis	41(68.3%)	**0**(0%)	**0**(0 %)	56(93.3%)	23(38.3%)
Pseudomonas aeruginosa	22(36.7%)	47(78.3%)	51(85%)	23(38.3%)	0(0%)
Coliform	0(0%)	37(61.7%)	0(0%)	0(0%)	0(0%)

The microbial growth were detected in 254(84.7%) out of 300 food contact surface swabs. Knives, benches, and utensils showed 100% bacterial growth meanwhile hands and shelves showed bacterial growth in 38.3% and 85% respectively. More than one bacterial species were shown in samples of Knives benches and utensils meanwhile only one species of bacteria were shown in hands and shelves

Table (2); the positive bacterial growth and the Aerobic Plate Count of food samples (n=12 for each type of food).

Type of food	Positive food samples	CFU/gm^3
Legumes	4(33,3%)	1×10^3
Vegetables	5(41,7%)	3×10^2
Amylaceous	4(33,3%)	3×10^2

SSMO of Vegetables $=10^2$ to 10^4

SSMO of Amylaeous $=<10^4$ to 10^5

The bacterial growth was detected in 13(36.1%) of food prepared and served to patients in hospitals. The Aerobic Plate Count of these positive revealed a range of 3×10^2 -1×10^3CFU/gm^3.

Table (3): The frequency of isolation and Aerobic Plate Count of *Staphylococcus aureus coagulase +ve* in food prepared and served to patients . (n=12 for each type of food)

Type of food	Positive food samples for *Staph.aureus*	CFU/gm^3
Legumes	3(25%)	3×10
Vegetables	2(16.7%)	3×10^2
Amylaceous	1(8.3%)	3×10^2

Staphylococcus aureus coagulase +ve were recovered from 6 food samples of the positive bacterial growth with a range of 3×10 in legumes and 3×10^2 for each of vegetables and amylaceous.

Acceptable limit (7) (Ready to eat foods) 10^2 to 1× 10^3

Discussion:

The high percentage (84.7%) of the presence of microbial growth in the different types of food contact surfaces indicated improper cleaning and that the utensils, equipment's, knives and shelves were stored under conditions which did not prevent contamination. The presence of *Coliforms* in (61.7%) benches of the hospital kitchens indicates potential hazard. The study showed that (52.8%) of ready to eat- food samples were positive for microbial growth. This indicated high percentage contamination of ready to eat food for patients in the hospitals. The possible sources of food contamination were attributed to the contamination of the food contact surfaces. According to (8), (9), such contaminated surfaces and the direct contact with the prepared food would be a major reason for microbial contamination of food. About (68.4%) of those detected with bacterial contamination revealed APC in the range of 3×10^2 for 41.7 % samples of vegetables and in the range of 3×10^2 for both 33.3 % samples of each of amylaceoues and legumes. This APC were found to be within the limits of acceptable ready to eat food (7). The microbiological testing for detection of the presence of certain pathogens in ready to eat food revealed (31.6%) food samples with *Staphylococcus aureus Coagulase positive.* The types of food encountered with this pathogen included 25 % of legumes, 16.7% of vegetables and 8.3% of amylaceous. The presence of *Staphylococcus aureus Coagulase positive* in such ready-to-eat food of this study is potentially hazardous for patients in the

hospitals. Their presence may be due to improper personal hygienic practices of not washing hands before or after touching cooked foods Comparing this finding with other previous studies done in France (11) and Turkey (12) similarity were found.. Actions were needed for correction in such a way that hospitals should have their food handling controls investigated, ensure well hygiene practices and determine the sources of contamination, cleaning and disinfection procedures used in the hospital kitchens.

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