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Microbiological Evaluation of Meals Served to Students in the University City Restaurant of Benha University

Hanaa M. Abdel Samee ; Mahmoud H. Mohamed and Ashraf M. Sharoba
Food Tech. Dept., Faculty of Agric., Banha Univ., Egypt.

Corresponding Author Email: ashraf.shraouba@fagr.bu.edu.eg

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Abstract

Food made at the university can be a vehicle for foodborne diseases and food poisoning if it is not handled properly. In this study, the microbiological quality of foods (bread, cooked chicken, cooked meat, cooked rice, cooked macaroni, cooked vegetable, cooked legumes, feta cheese, boiled eggs, processed cheese, and jam) was assessed at the Benha University campus. A total of three random samples of breakfast, lunch and dinner samples were collected from the campus student's restaurant after cooking. The result obtained revealed that the mean bacterial count from the breakfast meal sample was 6.9×10^3 cfu/g on bread and 3×10 cfu/g on biscuits, while lunch meal total bacterial count ranged between 2.9×10^2 and 8.5×10^4 cfu/g. On the other hand dinner meal, the total bacterial count ranged between 3.5×10^2 and 8.1×10^4 cfu/g. Pathogenic bacteria in breakfast, lunch and dinner meals were not detected for coliform group and *Salmonella sp.* counts. While *Staph. aureus* was a little count for breakfast lunch and dinner meals. This means that food items in this study were carried out under sanitary conditions with very good food hygiene. This study recommended that food handlers should ensure strict personal hygiene and that of the environment, and the general sanitary condition of the university hostel restaurant should be improved.

Keywords: Assessment, Bacteriological, Pathogenic bacteria and meals.

Introduction

It is vital for food makers in both developed and developing nations to comprehend the ecology of diseases and their traits that are relevant to food safety since foods provide a vehicle for the transmission of these infections to humans. Before designing interventions for microbial inactivation or regulation of microbial growth in foods, it is crucial to have this understanding. **(Mendonca *et al.*, 2020).**

Despite the fact that foodborne illness is preventable, more than 56,000 people fall ill each year in the United States, leading to significant financial consequences, lost productivity, and decreased quality of life for many. Experts concur that the home is the main setting for foodborne outbreaks, but many consumers do not think that the home poses a risk. Health care providers must be aware of how clients behave when it comes to food safety at home and provide individualised, theory-based food safety interventions. **(Byrd-Bredbenner *et al.*, 2013).** Investigating foodborne illnesses linked to 31 foodborne pathogens and spoilage microorganisms cost the US economy 77.7 billion dollars yearly, which is a significant loss. (**Scharff, 2012**).

It is crucial to understand the quantities of viable microorganisms that raise red flags or indicate that a food product has reached the end of its shelf life when using mathematical predictive models for microbial survival, growth, or death. Larger businesses typically have the resources for microbial testing and the creation of microbiological criteria, regardless of whether a nation has a developed or developing economy. For a clear reason, namely competitive advantage, these criteria almost never become public and always remain confidential. Tiny, medium-sized, and very small food operations are widespread in poor nations, where they frequently lack access to information on microbiological standards. When accessible, this information can be obtained in publications from the International Commission for Microbiological Safety of Foods (ICMSF), peer-reviewed scientific journals, industry standards of conduct, and publications on legislation. Regarding current microbiological challenges, such as the advent of novel pathogens and new food products and procedures, some of the latter

knowledge may actually be outdated and hence insufficient or useless **(FSANZ, 2018).**

Nowadays, emerging societies still struggle with the issue of microbiological food safety. Issues with food safety today are negatively altering how people live in the developing nations. The most ignored aspect of disease control is the prevalence of foodborne illness in developing countries. In underdeveloped communities, infections with *E. coli*, *Salmonella*, and *Staphylococcus aureus* are extremely common and pose a serious threat to human health. (**Akhtar *et al.*, 2014).**

Food safety issues are a major concern in developed countries. In this context, strict microbiological criteria for different food products, as well as food safety and quality regulations, have become the norm in developed nations. Even more crucially, emerging nations must adhere to these norms in order to ensure the security of their food exports and reap the financial benefits of having their food goods accepted into the global food trade. A number of obstacles prevent food goods from developing nations from entering the international food trade market. Lack of knowledge regarding the microbial ecology of foods is a significant impediment to the creation of microbial standards, specifications, and microbial control procedures. **(Mendonca *et al.*, 2020).**

When meat meals are prepared in kitchens, such as those found in hospitals, dorm rooms for students, youth hostels, and shared homes, the risk of bacterial foodborne illnesses rises. Due to the large number of people using the kitchen, the lack of responsibility, and the different hygienic standards for these kitchen's users, this raises the risk. (**Sharp and Walker, 2003**).

The main sources of food contamination in both raw and cooked forms are thought to be poor personal hygiene, insufficient cleaning of storage and preparation spaces, and dirty utensils. Bacteria can flourish when these foods are handled improperly. Additionally, no food should ever be left out of the refrigerator for more than two hours, **(FSIS, 2008).**

Because of its deliciousness and high nutritional value from the protein and vitamins, meat makes up a significant portion of the meal offered at university student residences. It provides a very favourable environment for the growth of harmful bacteria because of its high nutritional value. When meat meals are prepared in kitchens, as in dorm rooms and youth hostels, the risk of bacterial food borne illnesses rises **(Gitahi *et al.*, 2012).**

Cross-contamination of raw and cooked foods, insufficient cooking, and storage at unsuitable temperatures are common improper practises known to cause microbial food related illness (**Egan *et al.*, 2007**).

Enterotoxins produced by specific strains of *S. aureus* cause staphylococcal food poisoning, which manifests as intoxication-related symptoms rather than an infection. The most typical signs and symptoms are nausea, vomiting, stomach cramps, and diarrhoea, and they start to manifest 3 to 8 hours after intake. Typically, symptoms last for a short time (approximately 24 - 48 hrs) (**Sandel and McKillip, 2004**)

Since some of the members of the coliforms group are hazardous and can cause serious illnesses and food poisoning, their presence in meat is of epidemiological interest. Indicating faecal contamination of meat due to improper processing and/or post-processing recontamination of meat is thus possible using the total coliforms count (**ICMSF, 1998**).

One of the most important duties of the health authorities is to pay attention to the health issues of the staff of any institute. Such studies are extremely important and will be useful in the supervision and control of the quality of foodstuffs, especially in a university centre, as the consumption of healthy food is one of the significant factors affecting health. In order to better understand the bacteriological quality of meals provided to students at a university hostel restaurant, this study looked into it. Therefore, the purpose of this study is to evaluate the safety of the cooked meals at the university dorms by looking at their bacteriological status.

Materials and Methods

3.1. Materials:

Three random samples of breakfast, lunch and dinner meals in the university hostel restaurant after cooking (3 of each). We were collected from the university student hostel. The cooking method is boiling, then frying, for cooked chicken samples, and boiling only for meat, rice, macaroni, vegetables (potato), and legumes (pea) samples. The collected samples were kept in separate sterile plastic bags and transferred directly to the laboratory in a box under complete aseptic conditions without undue delay to be subjected to the following examinations.

3.2. Methods:

3.2.1. Microbiological evaluation:

3.2.1.1. Preparation of samples for microbiological evaluation:

For microbial analysis of different samples in agreement with standard methods for total microbial count (**ISO 4833-1, 2013**).

3.2.1.2. Total bacterial count:

Two duplicate sets of Petri- dishes, 1ml aliquots from 10^1 to 10^6 dilutions by pipette in standard plate count agar and melted in following steam. After solidification, the Petri- dishes were inverted and incubated at 37°C for 48 hours. The growing aerobic colonies were counted and multiplied by the dilution factor **ISO 4833-1** (**2013**).

3.2.1.3. Mesophilic spore-forming bacterial:

Mesophilic microorganism was evaluated using nutrient agar (Hi-Media, India) and via the

Koch's method, according to the methodology described in **ISO 6887-1 (2017).** Nutrient agar Petri dishes were inoculated with 1 ml of each juice sample and cultivated for 72 h at 30°C. Analysis was performed in duplicate.

3.2.1.4. Yeasts and molds:

The yeasts and molds as described by **ISO 21527-2** (**2008**), incubation at 20-25°C for 5 days.

3.2.1.5. Coliform bacterial:

Suspend 41.5 g in 1000 ml distilled water using violet red bile glucose agar, the pH value of the ready- to-use medium at 45-50°C was adjusted 7.4 as reported by the methodology of **ISO 21528-2** (**2004**).

3.2.1.6. *Staphylococcus aureus* count:

Staph. aureus bacterial was determined according to the method described by **ISO 6888-1 (1999; 2003)** . The plates were incubated at 37^{o}C for 24 hr.

3.2.1.7. Detection of *Salmonella spp.:*

Salmonella was determined according to the method described by **ISO 6579-1 (2017)** as follows:

3.2.1.7. 1. Pre-enrichment:

Twenty-five grams of sample were mixed with 225 ml peptone and incubated at 37^{o}C for 16-20 hr.

3.2.1.7. 2. Selective-enrichment broth:

One ml from each pre-enrichment was transferred to 10 ml tetrathionate broth and incubated at 35^{o}C for 48 hr.

3.2.1.7. 3. Selective plating medium:

Salmonella-shigella agar plates and incubated at 35^{o}C for 24 hr. *Salmonella* appeared as black colonies, some of them with metallic sheet.

Results and Discussion

4.1. Microbiology quality of breakfast meal in university hostel restaurant:

Following preparation, three samples of breakfast, lunch, and dinner meals were served in the university dorm restaurant. We were picked up from the university residence hall. Cooking method is boiling then fried for cooked chicken samples and boiling alone for meat, rice, macaroni, vegetable (potato) and legumes (pea) samples. The collected samples were preserved in separate sterile plastic bags and delivered directly to the laboratory in a box under perfect aseptic conditions without unnecessary delay to be subjected for the subsequent analyses. A food processor can use the results of the APC to learn about the quality or handling history of the raw materials, the circumstances of food processing and storage, and handling of the finished product. It can also be used to predict a food product's shelf life or upcoming sensory change. (**Mendonca *et al.*, 2020).** When the APC increases to about 10^{6}–10^{7} per g or ml, observable changes in food quality characteristics brought on by microbial growth and enzyme production typically take place. The total bacterial count of a breakfast meal changed, according to data tabulated in **Table (1)**. The total number of bacteria in the food samples ranged from 3.0×10 to 6.9 ×10^{3} cfu/g, according to these findings. Biscuits had a count of 3.0×10 CFU/g and bread had a count of 6.9×10^{3} CFU/g.

The changes in breakfast meals are shown in **Table (1)** data on mesophilic spore formers. The mesophilic spore formers bacteria count of the food item samples ranged between 5.0 and 6.0×10 cfu/g, according to these data. Jam had the lowest count at 5.0×10 cfu/g and bread had the highest at 6.0×10 cfu/g. **Table (1)** data on yeasts and moulds, on the other hand, illustrate how breakfast meals have changed. These findings showed that the yeast and mould counts of the food items samples ranged from 2.0 to 5.0×10 cfu/g. Jam had the lowest level, 2.0×10 cfu/g, while processed cheese had the highest count, 5.0×10 cfu/g. A high quality system is used in the processes of receiving, processing, cooking, cooking, storage, and servicing due to the use of good raw materials from the local market. While the related study discovered a high load microbial due to the non-application of quality systems during receiving, processing, cooking, cooking, storing, and serving, all of this reduces the microbial load and its lack of pathogenic bacteria.

4.1.2. Microbiology quality of lunch meal in university hostel restaurant:

Due to the different of meal components, initial microbiological quality, level of processing, post-process treatment, and stage of shelf life, the APC might differ significantly amongst prepared meals. Monitoring sanitary habits can be done with the use of Enterobacteriaceae. High populations of gram-negative organisms (>107) typically result in deterioration. As a result, professionals in the food industry should be cautious when using and interpreting the APC for prepared meals and understand the nature of particular products. (**Mendonca *et al.*, 2020**).

The total bacterial count of a lunchtime meal changed, as shown by the data tabulated in **Table (1)**. These findings showed that the total bacterial count of the food samples ranged from 2.9×10^{2} to 8.5×10^{4} cfu/g. Pickled olives had the highest count (8.5×10^{4} cfu/g), while nectar (mango) had the lowest (2.9×10^{2} cfu/g).

The differences in lunchtime meals are shown in **Table (1)** data on mesophilic spore formers. From these results, it could be noticed that the mesophilic spore formers bacteria count of food items samples ranged between 1.0×10 and 6.0×10 cfu/g. Bread had the highest count (6.0×10 cfu/g), and nectar (mango) had the lowest (6.0×10 cfu/g).

Table 1. Microbiology quality of breakfast, lunch and dinner meals (CFU/g).

Meal	Food items	Microbiological examination (CFU/g)		
		Total bacterial count	Mesophilic Spore formers bacteria	Yeasts and molds
Breakfast meal	Bread	6.9×10^3	6.0×10	4.0×10
	Chipsy	3.5×10^2	ND	1.0×10
	Processed cheese	1.25×10^3	5.5 ×10	5.0×10
	Jam	1.2×10^2	5.0×10	2.0×10
	Biscuits	3.0×10	ND	3.0×10
Lunch meal	Cooked chicken	1.7×10^4	3.5×10	6.0×10
	Cooked meat	3.9×10^4	4.5×10	8.0×10
	Cooked rice	5.4×10^3	5.0×10	2.0×10
	Cooked macaroni	6.5×10^4	2.5 ×10	5.0×10
	Cooked vegetable (Potato)	5.5×10^3	2.0×10	3.0×10
	Cooked legumes (Pea)	6.1×10^3	3.0×10	4.0×10
	Pickled olives	8.5×10^4	2.0×10	3.5×10
	Nectar (mango)	2.9×10^2	1.0×10	1.5×10
	Fruit (orange)	3.5×10^3	ND	3.5×10
	Tahina	6.6×10^3	3.0×10	2.5×10
	Feta cheese	5.5×10^4	3.5×10	1.5×10
dinner meal	Boiled Egg	8.1×10^4	2.5×10	2.0×10
	Halwa Tahini	7.8×10^3	5.5×10	3.0×10
	Fava beans	4.4×10^3	3×10	5.0×10
	Yogurt	6.5×10^4	4.5×10	2.5×10

*ND: not detected CFU: Colony Forming Unit

On the other hand, statistics from **Table 1** yeasts and moulds demonstrate changes in lunchtime meals. These findings showed that the yeast and mould counts of the food items samples ranged from 1.0×10 to 8.0×10 cfu/g. Cooked meat had the greatest count (8×10 cfu/g), while chipsy had the lowest (1×10 cfu/g). A high quality system is used in the processes of receiving, processing, cooking, cooking, storage, and service due to the choice of good raw materials from the local market. While the corresponding researchers discovered a high load microbial due to the non-application of quality systems during receiving, processing, cooking, cooking, storing, and serving, all of this reduces the microbial load and its absence of pathogenic bacteria.

While the related study discovered a high load microbial due to the non-application of quality systems during receiving, processing, cooking, cooking, storing, and serving, all of this reduces the microbial load and its lack of pathogenic bacteria. Molds and yeast are pervasive in the environment and can infect food through polluted air or improperly cleaned surfaces that come into touch with food. These organisms survive on foods in environments that do not favour the growth of bacteria, like pH, water activity, or high concentrations of sugar or salt. So, in foods like fruits and fruit beverages, fermented items, dairy products, pickled/marinated products, dried foods, intermediate moisture foods, soft drinks, and alcoholic beverages, a number of fungus eventually form the dominating spoilage microflora. In addition to discoloration, musty odours, off flavours, gas, or sediment, fungi can also spoil food by producing mycotoxins, which can be toxic and carcinogenic to consumers (**Mendonca *et al.*, 2020**).

4.1.3. Microbiology quality of dinner meal in university hostel restaurant:

The total bacterial count of the supper meal changed, as seen by the data given in **Table (1)**. These findings showed that the overall bacterial count of the food samples ranged from 3.5×10^2 to 8.1×10^4 cfu/g. The boiled egg had the highest count (8.1104 cfu/g), while the chipsy had the lowest (3.51×10^2 cfu/g).

The changes in dinner meals are seen in **Table (1)** data for mesophilic spore formers. The mesophilic spore formers bacteria count of the food item samples ranged between 2.5×10 and 6.0×10 cfu/g, as seen from these data. The bread had the greatest count (6×10 cfu/g), and the cooked egg had the lowest amount (2.5×10 cfu/g).

Table (1) data on yeasts and moulds, on the other hand, illustrate how dinnertime menus have changed. These findings showed that the samples of food items contained yeast and mould in the range of 1.5×10 to 5.0×10 cfu/g. Fava beans and chips had the highest count (5.0×10 cfu/g), while feta cheese had the lowest (1.0×10 cfu/g).

4.2.1. Pathogenic bacterial of breakfast meal in university hostel restaurant:

The family Microccaceae, which has thirteen species and four subspecies, includes *Staphylococcus*

organisms. The majority of *Staphylococcus aureus* strains cause blood plasma to coagulate and produce a golden pigment. It is undesirable when they are present in excessive quantities in diet (**Jay, 2000**). **Table (2)** shows the changes in the number of Staphylococcus aureus in the bread of the breakfast meal. The data obtained showed that, in contrast to the bread sample, which had 2.0×10 CFU/g, all foods associated with breakfast meals were confirmed to be devoid of staphylococcus aureus germs. This indicates that the food used in this study was prepared under sanitary circumstances and with excellent food hygiene.

The most significant organism in this group is E. coli, which has a direct connection to the symptoms of gastroenteritis, particularly diarrhoea, in addition to having a significant impact on the hygienic quality of minced meat, whether it is raw or frozen (**Cruickshamk *et al.*, 1975**). The information received showed that no coliform bacteria were present in any of the foods associated with the breakfast meals. This indicates that the food used in this study was prepared under sanitary circumstances and with excellent food hygiene. Testing for Enterobacteriaceae and coliforms is most commonly used to evaluate the general quality of food products and the hygienic standards upheld throughout processing.

Table 2. Pathogenic bacterial of breakfast, lunch and dinner meals (CFU/g).

Meal	Food items	Microbiological examination (CFU/g)		
		Coliform group counts	*Staph. aureus*	*Salmonella sp.*
Breakfast meal	Bread	ND*	2.0×10	ND
	Chipsy	ND	ND	ND
	Processed cheese	ND	ND	ND
	Jam	ND	ND	ND
	Biscuits	ND	ND	ND
Lunch meal	Cooked chicken	ND	1.0×10	ND
	Cooked meat	ND	1.5×10	ND
	Cooked rice	ND	2.0×10	ND
	Cooked macaroni	ND	1.0×10	ND
	Cooked vegetable (Potato)	ND	1.0×10	ND
	Cooked legumes (Pea)	ND	1.0×10	ND
	Pickled olives	ND	2.5×10	ND
	Nectar (mango)	ND	3.0×10	ND
	Fruit (orange)	ND	5.0×10	ND
	Tahina	ND	3.0×10	ND
	Feta cheese	ND	2.5 ×10	ND
dinner meal	Boiled Egg	ND	1.0×10	ND
	Halwa Tahini	ND	5.0×10	ND
	Fava beans	ND	ND	ND
	Yogurt	ND	3.5 ×10	ND

*ND: not detected CFU: Colony Forming Unit

The effectiveness of thermal process for eliminating bacteria in a food or beverage product can be assessed using these indicator organisms. Additionally, because Enterobacteriaceae and coliforms are both eliminated by an efficient pasteurisation temperature and duration, they can be used to identify post-pasteurization contamination of food products. Although both microbial groupings have the same function, Enterobacteriaceae is more commonly utilised in Europe than it is in the United States (**Mendonca *et al.*, 2020**). According to the data in **Table 2**, all food samples were fully free of salmonella spp., which is in line with the **Egyptian standard specification (2009).**

4.2.1. Pathogenic bacterial of lunch meal in university hostel restaurant:

Table (2) reveals the variations in the number of *Staphylococcus aureus* in the lunchtime meal. According to the data, *staphylococcus aureus* germs were present in all of the lunchtime food items in amounts ranging from 1.0 ×10 to 5.0 ×10 CFU/g. The cooked macaroni, cooked legumes, and cooked vegetables had the lowest counts at 1.0×10 CFU/g while the highest count was fruit (orange), which had 5.0×10 CFU/g. These findings concur with those made by **Hassan *et al.* (2018)** who discovered the staphylococcal count (cfu/g) in the samples of cooked meat that were under investigation. And for cooked beef, the range was from 1.0 $\times 10^2$ to 2.0×10^3, with an average of $7.78 \times 10^2 \pm 1.64 \times 10^2$.

The prevalence of Enterobacteriacae, Coliform, *Staph. aureus*, and *E. coli* was also shown by **Salem *et al.* (2020a)** to be failed to be detected, failed to be detected, 33.33%, and failed to be detected in cooked chicken thigh, failed to be detected, failed to be detected, 33.33%, and failed to be detected in cooked chicken breast, as well as 35%, failed to be detected, 20%, and failed to be detected It was evident from the results in **Table (2)** that no coliform bacteria were present in any of the foods associated with the noon meals. This indicates that the food used in this study was prepared under sanitary circumstances and with excellent food hygiene.

According to **Salem *et al.* (2020b),** this study looked at the prevalence of chicken meat and beef samples both before and after cooking. The samples were divided into six groups: control (untreated), treated (5% PM, 3% PM, 4% ACV, 2% ACV), and mixed (2% ACV and 3% PM). APC, Enterobacteriacae, coliform, and the prevalence of *Salmonella, E. coli, and Staph. aureus* were all determined from the samples. Compared to the other treated groups, the treated groups that received the combination of 2% ACV, 3% PM, and 5% PM had the best results.

According to **Edris *et al.* (2022)**, the incidence of *Salmonellae, E. coli, and S. aureus* was 8%, 4%, and 2% in defrosted chicken, failing to be isolated from newly cooked chicken, and 0%, 4%, and 0% in late served chicken in the studied samples from receiving to serving. *Salmonellae, S. aureus, and E. coli* were present at rates of 10%, 0%, 0%, 10%, 0%, and 20%, respectively, in swab samples taken from cutting boards, blades, and workers' hands. According to the information in **Table 2**, all food samples were fully free of *salmonella spp.*, which is in line with the **Egyptian standard specification (2009).**

4.2.3. Pathogenic bacterial of dinner meal in university hostel restaurant:

Table (2) outlines the variations in dinner meal *Staphylococcus aureus* counts. The data obtained showed that every food item associated with the supper meals had between 1.0×10 and 5.0×10 CFU/g of *staphylococcus aureus* germs. The boiled egg had the lowest count at 1.0×10 CFU/g and the halwa tahini had the highest at 5.0×10 CFU/g. This indicates that the food used in this study was prepared under sanitary circumstances and with excellent food hygiene. The information received showed that no coliform bacteria were present in any of the foods associated with the supper meals.This indicates that the food used in this study was prepared under sanitary circumstances and with excellent food hygiene. According to the information in **Table 2**, all food samples tested were completely free of *Salmonella spp*., which is in line with the **Egyptian standard specification (2009).**

Conclusions

Referring to the obtained results, cooking and storage measures appeared to significantly affect the bacterial count of the cooked meals and their quality as well; surrounding surfaces closely contact food surfaces as if food handlers represent the most critical point in the cross-contamination of cooked meals. So, the application of strict hygienic measures during the receiving, cooking, storage, and handling of each food item is significant for wholesome meals and keeping students at a university hostel restaurant healthy.

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التقييم الميكروبيولوجي للوجبات المقدمة للطلاب في مطعم المدينة الجامعية لجامعة بنها

هناء محمد عبدالسميع – محمود حسن محمد وأشرف مهدى شروبه

* قسم الصناعات الغذائية – كلية الزراعة بمشتهر – جامعة بنها.

يمكن للأغذية المحضرة في المدن الجامعية والتي تقدم للطلاب في الجامعة أن تكون وسيلة للأمراض التي تنتقل عن طريق الأغذية والتسمم الغذائي إذا لم يتم التعامل معها بشكل صحيح. في هذه الدراسة، تم تقييم الجودة المكروبيولوجية لبعض الأغذية (الخبز، الدجاج المطبوخ، اللحوم المطبوخة، الأرز المطبوخ، المعكرونة المطبوخة، الخضار المطبوخة، البقوليات المطبوخة، جبنة الفيتا، البيض المسلوق، الجبن المطبوخ والمربى) والتي تقدم لطلاب المدن الجامعية في جامعة بنها أثناء الواجبات الثلاثة الأقطار والغذاء والعشاء. تم جمع ثلاث عينات عشوائية من عينات الإفطار والغذاء والعشاء من مطعم الطلاب بالحرم الجامعي بعد الطهي. أظهرت النتائج أن متوسط العد البكتيري من عينة وجبة الإفطار كان 6.9 × 103 قدم مكعب / جرام على الخبز و 3 × 10 قدم مكعب / جرام على البسكويت، بينما تراوح العدد الكلي للبكتيريا في وجبة الغداء بين 2.9 × 102 و 8.5 × 104 قدم مكعب / جرام. ز. من ناحية أخرى، تراوح العدد الإجمالي للبكتيريا بين 3.5 × 102 و 8.1 × 104 كفو / جم. لم يتم الكشف عن البكتيريا المسببة للأمراض في وجبات الإفطار والغذاء والعشاء لمجموعة بكتيريا القولون والسالمونيلا والمكورات العنقودية الذهبية كانت قليلة في وجبات الإفطار والغذاء والعشاء. هذا يعني أن المواد الغذائية في هذه الدراسة تم إجراؤها في ظل ظروف صحية ونظافة غذائية جيدة جدًا وتم تطبيق معايير سلامة الغذاء. أوصت هذه الدراسة بضرورة أن يضمن متعاملو إعداد وتقديم الطعام النظافة الشخصية الصارمة والبيئة وتطبيق معايير واشتراطات هيئة سلامة الغذاء المصرية، ويجب تحسين الحالة الصحية العامة لمطاعم السكن الجامعي.

الكلمات المساعدة :

الجودة المكروبيولوجية – أغذية المدن الجامعية – العد الكلى للبكتيريا – بكتيريا القولون – السالمونيلا