Microbiological status of meat and chicken received to University student hostel

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A B S T R A C T

A grand total of 60 random samples of chicken and meat (30 of each) before and after cooking (n=15 of each) of both type was collected from a university student hostel, Egypt for microbiological examination. The average values of aerobic plate count and anaerobic count (cfu/g) were $5.4x10^4 \pm 7.9x10^3$and $2.6x10^4 \pm 4.4x10^3$ for raw meat, $3.6x10^4 \pm 2.1x10^3$ and $2.2x10^4 \pm 3.8x10^3$ for raw chicken meat ,$1.2x10^4 \pm 1.9x10^3$,$1.3x10^4 \pm$ $4.9x10^3$ for cooked meat and $1.9x10^4 \pm 2.2x10^3$ & $1.3x10^4 \pm 4.9x10^3$ cfu/g for cooked chicken meat, respectively. Moreover, the incidence of *S. Typhimurium, Staph aureus* and *C. perfringens* were 13.33%, 13.33% and 47.6%for raw chicken meat, 0.0, 13.33%, 26.66 % for cooked chicken meat. While, 6.67%, 20%, 20% for raw meat and 0.0,13.33%,13.33% for cooked meat examined samples, respectively for total examined samples. The public health importance of isolated microorganisms and recommended applications were discussed.

Keywords: Meat, poultry, APC, Anaerobic plate count, *Salmonella, Staph aureus, C. perfringens.*

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1. INTRODUCTION

Meat constitutes the center of the meal served at university student hostels because of its palatability and highly nutritional value by protein and vitamins. For this high nutritional value, it offers a highly favorable environment for the growth of pathogenic microorganisms. The risk of bacterial food borne diseases increases when meat meals are prepared in kitchens, as in student accommodation, youth hostels. This increase in risk may be due to the number of individuals using the kitchens, the lack of feeling of responsibility and the difference in the hygienic standard for the users of these kitchens (Sharp and Walker, 2003). Improper practices responsible for microbial food borne illness have been well documented by (Egan et al., 2007) and typically involve cross contamination of raw and cooked food, inadequate cooking and storage at inappropriate temperatures. Moreover, *Salmonella Typhimurium, Staph aureus* and *C. perfringens* are most worldwide food poisoning microorganisms (Stevenson and Breronard,1995). **(**Cui, 2004*)* mentioned that the symptoms of salmonellosis include diarrhea, nausea, vomiting, fever and abdominal cramps. Staphylococcal food poisoning has symptoms of rapid onset include nausea and violent vomiting with or without diarrhea (Argudin et al., 2010). *C. perfringens* food poisoning characterized by abdominal cramps and diarrhea. Symptoms appear 8-22 hrs after consumption of contaminated food (Brynested and Granum2002). So the aim of this study to evaluate the bacteriological status of this meat meals in university student hostel.

2. MATERIALS AND METHODS:

2.1. Collection of samples:

Sixty random samples of chicken and meat before and after cooking (30 of each) of

both types (15 of each). 100 gm weight, were collected from university student hostel. Cooking method are boiling then fried for cooked chicken samples and boiling only for meat samples. The collected samples were kept in separate sterile plastic bags and transferred directly to the laboratory of Food Hygiene in an ice box under complete aseptic conditions without undue delay to be subjected for the following examinations.

2.2. Preparation of samples:

Twenty-five grams of each sample were transferred into a sterile homogenizer flask containing 225 ml of 0.1% sterile buffered peptone water then homogenized at 2000 rpm for 1-2 min. to provide a homogenate of 1/10 dilution according to (APHA ,2001).

Determination of Aerobic plate count *(ICMSF, 1996),* total anaerobic bacterial count (*Roberts et al.,1995)*, total *Enterobacteriaceae* count *(ISO, 2004)*. Isolation and identification of *Salmonella*e *(ISO,2002)*, *Staphylococcus aureus* (ICMSF,1996) and C.*perfringens* (Carter and cole 1990) were carried out.

3. RESULTS

It is evident from the result recorded in table (1&2) that the mean value of APC, anaerobic Plate count (cfu/g) were $5.4x10^4 \pm 7.9x10^3$& $2.6x10^4 \pm 4.4x10^3$ for raw meat, $3.6x10^4 \pm 2.1x10^3$ & $2.2x10^4 \pm 3.8x10^3$ for raw chicken meat ,$1.2x10^4 \pm 1.9x10^3$& $1.3x10^4 \pm 4.9x10^3$ for cooked meat and $1.9x10^4 \pm 2.2x10^3$& $1.3x10^4 \pm 4.9x10^3$ for cooked chicken meat, respectively.

Isolation and identification of some food poisoning bacteria were occurred is shown in table (3) *Salmonella Typhimurium, Staphylococci aureus,* and *Clostridium perfringens has* been isolated and identified, the incidence was 13.33%,13.33% and 47.6%for raw chicken meat, 0.0, 13.33% ,26.66 % for cooked chicken meat and 6.67%,20%,20% for raw meat and 0.0, 13.33%,13.33% for cooked meat examined samples, respectively.

Table (4) indicated that *C. perfringens* is the most common organism isolated from examined samples by 26.66%. (16 of 60). Typing of *C.perfringens* into lecithenase positive strain and negative was applied. Results appeared that 31.25% (5 of 60) was +ve and 68.75% (11 of 60) was –ve lecithenase. Serotyping of +ve lecithenase *C. perfringens* recorded that type A is the most common isolated strain by 25% (4of 16) of total positive *C.perfringens* with 66.6% (2 of 3 positive strain) for raw chicken meat examined samples,100% (1 of 1) for cooked chicken and 0.0%,100%(1 of 1) for raw and cooked meat was recorded .06%(1 of 16) and 33.33%(1 of 3 of +ve lecithenase strain) for type D which appeared in raw chicken sample. While, type Band C failed to be detected in all examined samples. Clostridium perfringens is usually involved in food poisoning as it commonly distributed in nature.

Table (1): statistically analytical results of total aerobic plate count (APC) of examined chicken and meat meals in a university student hostel (n =15)

samples		Chicken meals		Meat meals	
count of C.F.U./g		Before cooking	After cooking	Before cooking	After cooking
Positive samples	No.	15	15	15	15
	%	100	100	100	100
Min.		$8.2x10^3$	$1.1x10^3$	$1.2x10^4$	$1.1x10^3$
Max.		$3.2x10^5$	$3.2x10^4$	$1.1x10^5$	$2.6x10^4$
Mean ± SE		$3.6x10^4 \pm$	$1.9x10^4 \pm$	$5.4x10^4 \pm$	$1.2x10^4 \pm$

	$2.1x10^3$	$2.2x10^3$	$7.9x10^3$	$1.9x10^3$

Table (2): statistically analytical results of total anaerobic plate count of examined chicken and meat meals (n =15)

samples		Chicken meals		Meat meals	
	count of C.F.U./g	Before cooking	After cooking	Before cooking	After cooking
Positive samples	No.	10	6	11	6
	%	66	40	73	40
Min.		$5.6x10^3$	$4x10^3$	$1.2x10^4$	$4x10^4$
Max.		$4x10^4$	$5.1x10^4$	$6.1x10^4$	$5.2x10^4$
Mean ± SE		$2.2x10^4$± $3.8x10^3$	$1.3x10^4$± $4.9x10^3$	$2.6x10^4$± $4.4x10^3$	$1.3x10^4$± $4.9x10^3$

Table (3): Incidence of *Salmonellae, Staph aureus* and *Clostridium perfringens* in the examined chicken and meat samples (n=15).

Examined samples	Raw chicken		Cooked chicken		Raw meat		Cooked meat	
	NO	%	NO	%	NO	%	NO	%
Salmonellae	2	13.33	0	0	1	6.67	0	0
Staph aureus	2	13.33	2	13	3	20	2	13
C. perfringens	7	46.66	4	26.66	3	20	2	13.33

Table (4): Incidence of Lecithinase positive strains of *C. perfringens* in the examined chicken and meat samples(n=15).

Samples	No of examined samples	No of +ve samples	Lecithenase +ve		Lecithenase –ve	
			No	%	No	%
Raw chicken	15	7	3	42.85	4	57.14
Cooked chicken	15	4	0	0	4	100
Raw meat	15	3	1	33.33	2	66.66
Cooked meat	15	2	1	50	1	50
Total	60	16	5	31.25	11	68.75

4. DISCUSSION:

It is evident from the result recorded in table (1) that the APC in examined samples nearly similar to result recorded by Mansour – waffaa (1995) who recorded 5.32 x 10^4 and lower than that recorded by Elwi (1994), Higher than that result recorded by Hashem-Salwa (2015) for raw chicken. Since in raw meat nearly similar results were recorded with El Taher- Amna (2009) who report 8.17 x 10^4 but lower than result was recorded by Arab waled (2010) and for cooked samples nearly similar results were reported by Eltaher Amna (2009) and Arab waled (2010) who recorded 2.4 x 10^5. Lower than that result recorded Ghanem (2009) who found it 6.38

x 10^7 and higher than that recorded by Soriano (2003). Although the APC of any food are not a sure indicative of their safety for consumption, yet it is of supreme importance in judging the hygienic condition under which food has been produced, handled and stored (Levine, 1987).

Table (2) recorded the result of total anaerobic plate count were recorded that there is no significance difference between anaerobic plate count for the examined chicken and meat samples. It nearly similar to result obtained by Hassan Hedia (2009) who recorded 8.7 x10^3.On the other hand, EL-Dally (1994) recorded lower results. Roberts *et al* (1984) reported higher results of anaerobic bacterial contamination.

Tables (3) was reported that *Staph aureus* was isolated from 13.33%, 20% for the examined chicken and meat before cooking and 13.33%, 13.33%for cooked, respectively. The presence of *Staph aureus* in heat treated food may be due to its contamination from food handlers, inadequate cleaned equipment or post processing contamination (Duffy *et al.*,2000). The incidence and serotyping of *Salmonella* isolated from the examined samples by 13.33 % and 6.67% from chicken and meat examined samples before cooking. They were identified serologically as *S. Typhimurium* $O_{1;1,4[5],12}$:H $_{i:1,2}$ and failed to detected in meat meal after cooking and this attributed to many stress factors which injured this bacteria, such as heat, which inhibit the repair mechanisms (Varnum and Evans,1991). Also, the prevalence of *C. perfringens* isolated from the examined chicken and meat samples with 46.66% &20% for chicken and meat before cooking and with 26.66%&13.33% after cooking in examined samples.

It is noticed that there was contamination and recontamination with *C. perfringns* in meat meals either before and after cooking especially in the presence of a lot of workers hand that dealing with handling cutting and preparing of the meat meals in place serving a large number of people in a certain time. (Smart *et al*., 1979) stated that *C. perfringens* food poisoning occurred as the failure of efforts done to prevent cross contamination and to maintain improper control of temperature.

The results reported in Table (4) showed that +ve lecithinase strains of *C.perfringens* isolates was typing into type A, B, C and D toxins. Type A demonstrate the superior percent as it appeared in 80% of +ve Lecithenase samples followed by type D with 20%. Type A was recorded by66.66% for +ve lecithenase examined raw chicken samples and 100%,100% of +ve lecithenase examined raw and cooked meat samples .Only one sample of +ve lecithenase represent type D by 33.33% of examined raw chicken . Accordingly the high bacterial count of some examined samples may be attributed to neglected sanitary measures during their handling ,preparation and serving .According to the obtained results it could be concluded that raw meat samples were the most contaminated with *Staph aureus* than other samples .This may reflect bad hygienic practice during different stages from slaughtering, handling practices ,transportation and excessive handling during preparation of the meal .And presence of this microorganism in post processing meat meal indicated that post processing contamination was occur.

5. CONCLUSION

According to the safe permissible limit stipulated by ESO (2005) No (1090-2005) for APC in raw poultry and meat were not exceed 10^5 and 10^6 cfu/g most of examined samples were in accordance with this limit in corresponding to meat meal samples but the presence of isolation of some food poisoning bacteria as *Salmonella typhimurium, Staph aureus* and *Colistridum perfringens* consider a major public health hazard. The obtained results in the current study concluded that the examined chicken and meat samples received at the university student hostel were contaminated with different food poisoning microorganisms

which appeared mostly in the meat meals before cooking rather than cooked one. As raw meat receives more bad hygienic condition from the point of slaughtering, handling, transportation, storage until to receiving which increased its contamination. Cooking especially boiling play a great role in killing of most of these microorganisms but not all. presence of heat resistance toxins from some of these bacteria represent a great public health hazard especially in places with great groups of people receiving this food. Also, post cooking recontamination when holding of such meals for a period until serving in unhygienic condition especially at room temperature or un sufficient reheating represent of major public health hazard.

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