Occurrence of certain pathogens in meat meals at hospital level

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ABSTRACT

This study was conducted on 90 random samples of beef and chicken meat meals (45of each) with weight 250gm for chicken and 150gm for beef, at kitchen hospital level represented as fresh (raw), boiled and fried samples (15 of each) collected from a Governmental hospital in Kaliobia Governorate to evaluate the bacterial quality of them, and hygienic health hazard of meat meals. The bacteriological examination resulted in, seven isolates of *E. coli* were isolated from examined meat samples represented as 3 from fresh chicken meat with serotypes O55:H7; O125:H18 and O78 (one from each type); 2 fried chicken meat with serotype O55:H7 and O125:H18 (one from each type) and 2 from Fresh beef with serotypes O55:H7 and O125:H18 (one from each type). Meanwhile, they failed to be isolated from boiled chicken meat; boiled beef and fried beef. In addition, 11 isolates of coagulase positive *S. aureus* were isolated from examined meat samples represented as 4 (26.7%) from fresh chicken meat; 2 (13.3%) from fried chicken meat; 4 (26.7%) from fresh beef and one (6.7%) from fried beef. Meanwhile, they failed to be isolated from boiled beef and chicken meat. Meanwhile, the present study failed to detect *Salmonella* serovars from all examined meat samples.

Key words: Meat meals, *E. coli*, *S. aureus*, *Salmonella*

(http://www.bvmj.bu.edu.eg) **(BVMJ-30(2): 12-16, 2016)**

1. INTRODUCTION

Despite the progress seen in recent times in medical care and food technology, food borne diseases are still, and increasingly, of major concern for human health. The hospital food service is largely intended for a population with altered defenses towards the infectious processes (immune-incompetent, at extreme age or in long-term hospitalization state) which increase the risk and gravity of disease (Custovic and Ibrahimagic, 2005). This risk varies according to numerous parameters as the microorganism's nature, the contamination level, the food nature and especially the consumer's physiological state. The intact tissues of healthy slaughtered birds and animals are mostly sterile but the meat may be contaminated during processing from the hands, worker's clothes, knives, the hide, the gut or from the environment resulting in an inferior or even unfit quality for human consumption. The most important bacterial pathogens in beef and chicken meat that are responsible for food-borne infections include *Escherichia coli*, *Salmonellae* and coagulase positive Staphylococcus *aureus* (Leloir et al., 2003; Datta et al., 2012and Abdaslam et al., 2014). *E. coli* is commonly non-virulent but some strains have adopted pathogenic or toxigenic virulence factors that make them virulent to human and animals. It has become recognized as a serious food borne pathogen and has been associated with numerous out breaks of disease resulting from contaminated meat products (Gi et al., 2009 and Datta et al., 2012). *Salmonella* species remains a leading cause of food poisoning in the developed world, resulting in multiple cases of gastroenteritis, illness, hospitalization and death each year (CDC, 2006). *Salmonella* is one of the microorganisms most frequently associated with food-born outbreaks of illness. Meat products in general and poultry, in particular, are the most common sources of food poisoning by *Salmonella* (Antunes et al., 2003 and Siqueira et al., 2003). Moreover, *S. aureus* is one of the most causative agents of food-borne disease outbreaks causing gastroenteritis and rarely acquired directly from raw meat but

mostly occurs due to either excessive handling or contamination during or after cooking of meat and meat products (Leloir et al., 2003; Plaatjies et al., 2004 and Busani et al., 2005).

Therefore, the aim of the present study was to evaluate the microbiological status of raw., boiled and fried beef and chicken meats at hospital kitchen to investigate their microbiological status.

2. MATERIAL AND METHODS

2.1. Samples collection:

A total of 90 random samples of chicken and beef meat meals (45of each), with weight 250gm for chicken and 150gm for beef, at kitchen hospital level represented as fresh(raw), boiled and fried samples of each type (15 of each) were collected from a Governmental hospital at various times in Kaliobia Governorate, Egypt. Each sample was kept in a separate sterile plastic bag and put in an icebox then transferred to the laboratory under complete aseptic conditions without undue delay and examined bacteriologically to evaluate the bacterial quality them and to evaluate the hygienic health hazard of meat meals with some food borne pathogens

2.2. Bacteriological examination

1. *Preparation of samples (APHA, 1992).*
2. Isolation and identification of *E. coli* following (ISO, 2001): Using Tryptone Bile x-Glucornic (TBX) media, appearance of bluish colonies with bluish halo zone. They were picked up for identification morphologically by Gram stain; biochemically, serologically by slide agglutination test (using *E. coli* antisera "SEIKEN" Set 1, consists of 8 polyvalent and 43 (OK) antisera of DENKA SEIKEN Co. LTD. Tokyo, Japan) following (Edward and Ewing 1972 and Quinn *et al*., 2002).
3. Isolation and identification of *S. aureus* using Baird-Parker Agar Plates. Suspected colonies (Black and shiny colonies with yellow halo zone around them) were picked up onto slants of nutrient agar for further purification then identified morphologically by Gram-stain; biochemically and coagulase activities according to ICMSF (1996) and Quinn *et al*., (2002)
4. Isolation and identification of *Salmonella* following ISO, (2002). Suspected *Salmonella colonies* that appeared as red with black centers on XLD agar and pink on Brilliant Green agar were identified morphologically by Gram-stain and biochemically according to Koneman *et al*., (1997) and Quinn *et al*., (2002). Data obtained were analyzed according to Snedecor and Cochran (1969) using the computer software program (SPSS, 2001).

5. RESULTS

The results of bacteriological examination of meat meals are presented in Tables (1, 2, 3). Tables (1 & 2) revealed that, 7 isolates of *E. coli* were isolated from examined meat samples represented as 3 from fresh chicken meat with serotypes O55:H7; O125:H18 and O78 (one from each type); 2 fried chicken meat with serotype O55:H7 and O125:H18 (one from each type) and 2 from Fresh beef with serotypes O55:H7 and O125:H18 (one from each type). Meanwhile, failed to be isolated from boiled chicken meat; boiled beef and fried beef. The results obtained in Table (3) revealed that, 11 isolates of coagulase positive *S. aureus* were isolated from examined meat samples represented as 4 (26.7%) from fresh chicken meat; 2 (13.3%)fried chicken meat; 4 (26.7%) from Fresh beef and one (6.7%)fried beef. Meanwhile, failed to be isolated from boiled beef and chicken meat).

Table (1): Incidence of *E. coli* in examined meat samples (n=15)

Sample	Positive	
	No.	%*
Chicken meat meals:		
Fresh chicken meat	3	20.0
Boiled chicken meat	0	0.0
Fried chicken meat	2	13.3
Beef meals:		
Fresh beef	2	13.3
Boiled beef	0	0.0
Fried beef	0	0.0
Total	7	7.8

* Percentage in relation to total number of sample in each row.

Table (2): Incidence and serotyping of *E. coli* isolated from positive meat samples (n=15)

Sample	Fresh chicken meat		Fried chicken meat		Fresh beef		Strain
E. coli serotype	No.	%*	No.	%*	No.	%*	characteristic
O55:H7	1	6.66	1	6.66	1	6.66	EPEC
O125:H18	1	6.66	1	6.66	1	6.66	ETEC
O78	1	6.66	0	0.0	0	0.0	EPEC
Total	3	20.00	2	13.33	2	13.33	-

* Percentage in relation to total number of each sample (15). EPEC: Enteropathogenic *E. coli* E TEC: Enterotoxigenic *E. coli*

Table (3): Incidence of Coagulase Positive *S. aureus* in examined meat samples (n=15)

Sample	Positive	
	No.	%*
Chicken meat meals:		
Fresh chicken meat	4	26.7
Boiled chicken meat	0	0.0
Fried chicken meat	2	13.3
Beef meals:		
Fresh beef	4	26.7
Boiled beef	0	0.0
Fried beef	1	6.7
Total	11	12.2

* Percentage in relation to total number of sample in each row. *Salmonella* serovars were failed to be detected in all examined samples of meat meals.

6. DISCUSSION

Foodborne illnesses caused by *E. coli*, *Salmonella* species and *S. aureus* represent a major public health problem worldwide. These pathogens are transmitted mainly through consumption of contaminated food and the presence of these organisms in meat has relevant public health implications (Sousa, 2008). The recovery of *E. coli* from meat samples indicates fecal contamination and implies that other pathogens of fecal origin may be present. The increased incidence of *E.coli* in the examined samples may be due to mishandling during production, processing and distribution (Aycicek *et al.,* 2004). The results in Tables (1&2) revealed that, 7 isolates of *E. coli* were isolated from examined meat samples represented as 3 from fresh chicken meat with serotypes *O55:H7; O125:H18 and O78 (one from each type); 2fried chicken meat with* serotype O55:H7 and O125:H18 (one from each type) and 2 from Fresh beef with serotypes O55:H7 and O125:H18 (one from each type). Meanwhile, failed to be isolated from boiled chicken meat; boiled beef and fried beef. These results came in accordance with those obtained by Marzano and Balzaretti (2011) and isolated from both chicken and beef meat by Maarouf and Nassif (2008); Kalchayanand et al., (2012); Windham et al., (2013) and Abd El-Salam (2014). These results coincided with the fact of Woody et al., (1998) who recorded that the same serogroups were Enteropathogenic *E. coli* and causing infantile enteritis; hemorrhagic colitis; hemorrhagic gastroenteritis and diarrheal illness in different settings.

Coagulase Positive *S. aureus* is still a major cause of food poisoning due to ingestion of enterotoxin (Le Loir et al, 2003), the ability to produce such enterotoxin in food is more likely when competing microorganisms were absent (Sandle and Mckillip, 2004). The results obtained in Table (3) revealed that, 11 isolates of Coagulase positive S.*aureus* were isolated from examined meat samples represented as 4 (26.7%) from fresh chicken meat; 2 (13.3%)fried chicken meat; 4 (26.7%) from Fresh beef and one (6.7%)fried beef. Meanwhile, failed to be isolated from boiled beef and chicken meat). These results came in accordance with those obtained by Marzano and Balzaretti (2011) and Costa et al., (2014). These results were disagreed with those of Mohamed-Seham(2003) who isolated coagulase positive *S.aureus* with high incidence (36.3% and 47.5%) from fresh chicken meat ;Raphael et al.,*(*2014) was 53% in cooked chicken meat and Abd El-Aal- Asmaa (2015) was 45% in boiled beef .Moreover, the *S.aureus* recovered from fresh and fried beef and chicken meat but not from boiled ones and this may be due to that the cocci usually more heat resistant than rods and could be used as target microorganism in designing mild thermal treatments for foods (Kennedy et al., 2005)or may be attributed to the lack of hand hygiene since such infection occurs when cooked foods are handled by persons who carry the pathogen in their nails or their skin (Protocarrero et al., 2002).

The present study failed to detect Salmonella serovars from all examined meat samples. These results were agreed with those recorded by Shaltout (2013); Abd EL-Raheem (2013)

and Raphael et al., (2014). Meanwhile, disagreed with those of Ruban et al., (2010); Oscar (2013); Younis-Eman (2013) and Abd El-Aal- Asmaa (2015) who isolated *Salmonella* from beef and chicken meat (fresh and cooked).

7. CONCLUSION

Finally, the present study proved that meat meals constitute public health hazard and the presence of; *E. coli*; (seven isolates of *E. coli*) Staphylococci mainly Coagulase Positive *S. aureus* (11 isolates) and absence of *Salmonella*, may be due to the hygienic preparation of the meals at hospital kitchen and the attained temperature for both boiling and frying was sufficient to kill bacteria and to the post-cooking contamination with handling.

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