



## prevalence of *Salmonella* and *Escherichia Coli* Organisms as Bacteriological Hazards in some Meat Products

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### ABSTRACT

Meat is considered an important source of proteins, essential amino acids, B complex vitamins and minerals. Due to this rich composition, it offers a highly favorable environment for the growth of pathogenic bacteria.

A total of 45 random samples of meat products represented by beef kofta, burger and luncheon (15 of each). The weight of each sample was 10 gm collected randomly from different supermarkets at Meonofia governorates. The incidences of *E-coli* in the examined samples of meat products were 46.67%, 40% and 26.67 for beef kofta, burger and luncheon, respectively. Moreover, the isolated serotypes of *E-coli* from the examined samples of meat products were O<sub>26</sub>:H<sub>11</sub>, O<sub>111</sub>:H<sub>4</sub>, O<sub>114</sub>:H<sub>21</sub>, O<sub>124</sub>, O<sub>55</sub>:H<sub>7</sub>, O<sub>119</sub>:H<sub>6</sub>, O<sub>127</sub>:H<sub>6</sub> and O<sub>128</sub>:H<sub>2</sub> with various percentages. The incidences of *Samonellae* in the examined samples of meat products were 26.67% and 13.13% for beef kofta and burger, respectively. While, all examined samples of beef luncheon were free from *Salmonellae*. Moreover, the isolated serotypes of *Salmonella* from the examined samples of beef kofta and burger were *S. Typhimurium*, *S. Enteritidis* and *S. Muenster*.

It is clearly demonstrating that there is high bacterial load beside a relatively high rate of pathogens (*E. coli* and *Salmonellae*), this may be due to mishandling and the negligence of hygienic aspects either at production levels where most workers did not have medical certificates or selling meat with expired dates. Therefore, it was concluded that *E. coli* and *Salmonellae* are meat-borne pathogens of public health important.

Key words: *Samonellae*, *E-coi*, kofta, burger, luncheon.

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### 1. INTRODUCTION

Meat and meat products are the most of digestable food of highly nutritive value for

human being as they are significant sources for protein, fat, essential amino acids, minerals, vitamins and other nutrients (Biesalski,

2005). Otherwise, they are considered as an ideal culture medium for growth of many organisms because of the high moisture, the high percentage of nitrogenous compounds, plentiful supply of minerals, some fermentable carbohydrates (glycogen) and of a favorable Ph for most microorganisms (Al-Mutairi, 2011). The primary habitat of *Salmonellae* is intestinal tract of animals and humans. In recent years, *E. Coli* has become recognized as a serious food born pathogen and has been associated with numerous out breaks of disease in the disease in UK, Japan and USA (Scotter et al ,2000). *Escherichia coli* includes a variety of different types that range from avirulent commensally strain that are present in normal intestinal flora to highly virulent strains that cause a variety of severs infections in both humans and animals.

Over 700 antigenic types or serotypes of *E. coli* have been recognized based on O, H and k antigen. Their pathogenicity is considered to be mainly by specific virulence factors such as adhesions, invasions, toxins and capsule (Kaper et al., 2004). Therefore, this study was planned out to evaluate the bacteriological status of meat products by isolation and identification of *Escherichia Coli* and *Salmonellae* from examined samples of meat products.

## 2.MATERIAL AND METHODS

### 1.Collection of Samples:

45 random samples of meat products represented by beef kofta, burger and luncheon (15 of each). The weight of each sampler was 10 gm which were collected randomly from different supermarket at meonofia governorates. The examined samples were kept in sterile plastic bags and preserved in ice box. All the

examined samples were subjected to bacteriological examination to isolate *E-coli* and *Salmonellae*.

### 2.Preparation of samples (APHA 1992):

Ten grams of examined samples were aseptically transferred to aseptic blender jar and 90 ml of 0.1 % sterile buffered peptone water were to (0.1%) were aseptically added to the content of jar. Each sample was then homogenized in the blender at 2000 rpm for 2 minutes to provide a homogenate, from which tenth-fold serial dilution were prepared.

### 3.Isolation of food borne pathogens:

#### 1.Isolation and identification of *E. Coli* (McFadden 2000):

The technique recommended by McFadden 2000 by using (E.M. B) Eosine Methylene Blue agar media. Suspected colonies for *E. Coli* were morphologically, biochemically and serologically identified.

#### Serotyping of *E. coli*:

*E. coli* isolates were serologically identified according to Kok et al. (1996) by using rapid diagnostic *E. coli* antisera sets (DENKA SEIKEN Co., Japan) for diagnosis of the Enteropathogenic types.

#### 2.Isolation and identification of *Salmonellae*:

The technique recommended by ISO, (2002) by using Xylose lysine Desoxycholate (XLD) agar media. Suspected colonies for *Salmonella* were morphologically, biochemically and serologically identified.

#### Serotyping of *Salmonella*:

*Salmonella* were serologically identified according to Kauffman – White scheme

(Kauffman, 1974) for diagnosis of the *Salmonella* types.

### 3.RESULTS:

Result achieved in tables (1) indicated that the incidence of *E. coli* in examined samples of meat products were 46.67%, 40% and 26.67% for beef kofta, burger and luncheon, respectively. While *E. coli* failed to be detected in the examined samples of beef luncheon. The serologically identified *E. coli* isolates in the

examined samples of beef kofta were O<sub>26</sub>:H<sub>11</sub> (13.33%), O<sub>111</sub>:H<sub>4</sub> (6.67%), O<sub>114</sub>:H<sub>21</sub> (6.67%), O<sub>55</sub>:H<sub>7</sub> (6.67%), O<sub>119</sub>:H<sub>6</sub> (6.67%) and O<sub>128</sub>:H<sub>2</sub> (6.67%), while in examined samples of beef

burger were O<sub>26</sub>:H<sub>11</sub> (13.33%), O<sub>111</sub>:H<sub>4</sub> (6.67%), O<sub>124</sub> (6.67%), O<sub>127</sub>:H<sub>6</sub> (6.67%) and O<sub>128</sub>:H<sub>2</sub> (6.67%).

The results in table (2) indicated that the incidence of *Salmonellae* in examined samples of meat products were 26.67% and 13.33% for beef kofta and burger, respectively and the serologically identified *Salmonella* isolates in the examined samples of beef kofta were *S. Typhimurium* (13.33%), *S. Enteritidis* (6.67%) and *S. Muenster* (6.67) for beef kofta. Moreover, in the examined samples of beef burger were *S. Typhimurium* (6.67%) and *S. Enteritidis* (6.67%). While *Salmonellae* failed to be detected in the examined samples of beef luncheon.

Table (1): Incidence and serotyping of Enteropathogenic *E. coli* isolated from the examined samples of meat products (n=15).

<i>E. coli</i> strains	Kofta		Burger		Luncheon		Strain Characteristics
	No.	%	No.	%	No.	%	
O <sub>26</sub> : H <sub>11</sub>	2	13.33	2	13.33	1	6.67	EHEC
O <sub>111</sub> : H <sub>4</sub>	1	6.67	1	6.67	1	6.67	EHEC
O <sub>114</sub> : H <sub>21</sub>	1	6.67	-	-	-	-	EPEC
O <sub>124</sub>	-	-	1	6.67	-	-	EIEC
O <sub>55</sub> : H <sub>7</sub>	1	6.67	-	-	1	6.67	EPEC
O <sub>119</sub> : H <sub>6</sub>	1	6.67	-	-	-	-	EPEC
O <sub>127</sub> : H <sub>6</sub>	-	-	1	6.67	1	6.67	ETEC
O <sub>128</sub> : H <sub>2</sub>	1	6.67	1	6.67	-	-	ETEC
<b>Total</b>	<b>7</b>	<b>46.67</b>	<b>6</b>	<b>40</b>	<b>4</b>	<b>26.67</b>	

Table (2): Incidence and serotyping of Salmonella isolated from the examined samples of meat products (n=15).

Salmonella serotypes	Kofta		Burger		luncheon	
	No.	%	No.	%	No.	%
<i>S. Enteritidis</i>	1	6.67	1	6.67	-	-
<i>S. Muenster</i>	1	6.67	-	-	-	-
<i>S. Typhimurium</i>	2	13.33	1	6.67	-	-
<b>Total</b>	<b>4</b>	<b>26.67</b>	<b>2</b>	<b>13.33</b>	<b>-</b>	<b>-</b>

#### 4.DISCUSSION

Foodborne illnesses caused by *E. Coli* and *Salmonellae* species represent a great public health problem worldwide. These pathogens are transmitted mainly through consumption of contaminated food and the presence of these organisms in meat and raw meat products has relevant public health implications (Normanno et al., 2007 and Sousa, 2008). It is well established fact that the main source of transmission for pathogenic bacteria is contaminated food, it is considered as the major cause of enteric diseases in developing countries and the major cause of mortality and morbidity. (Gunasegaran et al 2011).

The current results of the incidence of *E. coli* in the examined samples of beef kofta were lower than those obtained by Mohamed (2006) (4%), Nadim (2016) (28%) and Mohamed (2016) (12%) but similar to those obtained by Abdalla and Hassan (2004) (40%). The current results of the incidence of *E. coli* in the examined

samples of beef burger were higher than those obtained by Abou\_Hassien (2004) (64%) and Fathi et al(1994) (77.78%) and lower than those obtained by Hassan (2007) (15%), Mohamed (2009) (13.3%), Mewafy (2012) (10%) and Ahmed (2015) (13.2%), but similar to those obtained by Zaki (2002) (35%), and Hassan (2012) (32.5%).The current results of the incidence of *E.coli* in the examined samples of beef luncheon were higher than those obtained by Abou-Hussien (2004) (40%),but lower results were obtained by Abd-EL wahhab (2017) (16%) ,Ahmed (2017) (2.5%), Reyad(2015) (16%), Abd-EL-Hag (014) (4%), Hassan (2007) (7.5%) and Elewie (2003) (4%). but similar to those obtained by Attia (2016) (30 %).

While the current results of the incidence of *Salmonellae* in the examined samples of beef kofta were lower than those obtained by Mohamed (2009) (8%), Nadim (2016) (8%). The current results of the incidence of *Salmonellae* in

the examined samples of beef burger were lower than those obtained by Mohamed (2009) (4%) and Ouf (2001) (5%), higher than those by Mousa (2014) (20%), Yehia (2015) (20%). It failed to be isolated by Nadim (2016). While *Salmonella* failed to be detected in examined samples of beef luncheon similar to those obtained by Ouf (2001), Eleiwa (2003) and Abou Hussin (2014), but *salmonellae* could be detected in beef luncheon by Said (2014) (4%) and Yahia (2015) (4%).

Further than, O<sub>128</sub> serotype of *E. Coli* is called Enterotoxigenic *E. Coli* (ETEC), while strain cause desentry like syndrome (O<sub>124</sub>) are known as Enteroinvasive *E. Coli* (EIEC). While strains causing haemorrhagic colitis (O<sub>111</sub>) are recognized as Enterohaemorrhagic *E. Coli* (EHEC). Bryan (1982). In general, EPEC strains are the major cause for many infantile diarrhea, in typical cases, symptoms appear within 12 to 36 hours. Clinically, EPEC illness is characterized by fever, nausea, vomiting and watery stools, which occasionally contain mucous, but without gross blood (Toledo *et al.*, 1983). Furthermore, EPEC was implicated in cases of gastroenteritis, cystitis, colitis, pyelonephritis, and peritonitis as well as food poisoning outbreaks (Doyle, 1990). Therefore, EPEC showed to be the first bacterial cause of diarrhea in infants and its proportion may reach 54% (Varnam and Evans, 1991).

Salmonellosis is a great problem and one of the most important food born disease. Mishandling in preparation of food of animal origin was the major reason for the outbreak of salmonellosis (e.g. 25 of 35 registered outbreaks in 1986 were related to food of animal origin) (Rachmanin and Koulikouskii, 1990). The number of human cases of salmonellosis increased due to serious hygienic deficiency in food technology during processing, production

and storage of food as well as due to poor hygiene of personal working (Koutikoyski and Kasijanenko, 1991).

Therefore, the products which contaminated by *E. Coli* and *Salmonellae* are hazards for consumers.

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