Incidence of *E. coli* in some meat products

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A B S T R A C T

A grand total of 100 random samples of meat products represented by beef burger and kofta (50 of each) 100g were collected from different shops and hyper supermarkets in different districts in Menofia governorate. The incidence of *E. coli* in the examined samples of meat products were 28% and 36 %for beef burger and kofta, respectively. Moreover, the isolated serotypes of *E. coli* from the examined samples of meat products were $O_{26}: H_{11}$, O_{86}, $O_{55}: H_7$, $O_{104}: H_4$, $O_{111}: H_4$, $O_{114}: H_{21}$, $O_{119}: H_4$, O_{124}, $O_{125}: H_{21}$, $O_{167}: H_{21}$ and $O_{128}: H_2$ with various percentages, Also, application of sensitivity test on all *E. coli* strains indicated that most of them were multiple antimicrobial resistance (MAR) where the MAR index equal 0.515. The public health significance of the isolated organisms from meat products was discussed as well as some recommendations to ensure safety and quality of meat products reach to consumers.

Keywords: *E. coli*, Meat Products, Multiple antimicrobial Resistances.

1. INTRODUCTION

Meat is considered as an essential food, tasty, from the beginning a commitment to sanitation is a must. The remaining part was processed in order to preserve the meat for later consumption. Processing meat to meat products is away to preserve meat. Meat processing plants have a significant variation in degree of sanitation. Construction of facility for ease of sanitation and proper equipment must be available to employees to ensure successful completion of sanitation objectives (Saleh et al., 2012). In Egypt, meat products such as kofta and beef burger are gaining popularity as they represent quick easily prepared meat meals and solve the problem of the shortage in fresh meat of high price which is not within the reach of large numbers of families with limited income (Shawish 2015). Actually *E. coli* is commonly non virulent but some strains have adapted pathogenic or toxigenic virulence factors that make them virulent for man and animals (Malik and Memona, 2010). These pathogenic *E.coli* strains include enteropathogenic (EPEC), enterotoxigenic (ETEC), enteroinvasive (EIEC), enteroaggregative (EAEC), diffusely adherent (DAEC) and enterohemorrhagic (EHEC) types, of which *E. coli* O157:H7 is a member (Kaper *et al.,* 2004; Torres *et al.,* 2005). *E.coli* is commonly used as surrogate indicator; its presence in food generally indicates direct and indirect fecal contamination (Clarence et al., 2009). Therefore, this study was planned out to evaluate the bacteriological status of meat products ((beefburger and kofta) by isolation and identification of *Escherichia coli* from examined samples of meat products (beef burger and kofta) and detection of antibiotic sensitivity of isolated strains of *E. coli*.

2. MATERIAL AND METHODS

2.1. Collection of samples

One hundred random samples of meat products represented by beef burger and kofta (50 of each) were collected from different shops at various localities in Menofia governorate. Samples was kept in a separated sterile plastic bag and preserved in an ice box. All samples were subjected to the bacteriological examinations to evaluate their quality from bacteriological standpoint of view.

2.2. Isolation and identification of E. coli

The technique recommended by ISO, (2004) by using Eosin Methylene Blue (EMB) agar media. Suspected colonies for *E. coli* were morphologically and biochemically identified.

2.3. 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.

2.4. Antibiogramme for antibiotic sensitivity of isolated strains of E. coli

Antimicrobial susceptibility was tested by the single diffusion method according to Mary and Usha (2013) for E. coli. Sensitivity discs with variable concentrations were used to determine the susceptibility of the isolated E. coli strains *(*Oxoid Limited, Basingstoke, Hampshire, UK*)*.

3. RESULTS

Result achieved in table (1) indicated that the incidence of *E. coli* in the examined samples of meat products were 28% and 36% for beef burger and kofta, respectively. Also, data in table (1) revealed that the serologically identified *E. coli* isolates in the examined samples of beef burger were $O_{26}: H_{11}$ (8%), O_{86} (2%), $O_{111}:H_4$ (4%), $O_{119}:H_4$ (2%), O_{124} (4%), $O_{125}: H_{21}$ (6%) and $O_{167}:H_{21}$ (2 %), while in the examined

samples of kofta $O_{26}: H_{11}$ (6%), $O_{55}: H_7$ (6 %), $O_{104}: H_4$ (2 %), $O_{111}:H_4$ (10%), $O_{114}:H_{21}$ (4%) and $O_{128}: H_2$ (8 %). were identified.

Table (1): Incidence of *E. coli* in examined samples of meat products

E. coli Strains	Beef burger		Kofta		Strain
	No.	%	No.	%	
O26 : H11	4	8	3	6	EHEC
O55 : H7	0	0	3	6	EPEC
O86	1	2	0	0	EPEC
O104 : H4	0	0	1	2	EPEC
O114 : H21	0	0	2	4	EPEC
O111 : H4	2	4	5	10	EHEC
O119 : H4	1	2	0	0	EPEC
O124	2	4	0	0	EIEC
O125 : H21	3	6	0	0	ETEC
O128 : H2	0	0	4	8	ETEC
O167 : H21	1	2	0	0	EPEC
Total	14	28	18	36	

Table (2): Percentages of Antimicrobial susceptibility of *E. coli* strains isolated from the examined samples of meat products (n=32)

Agents	S		I		R	
	No.	%	No.	%	No.	%
E	-	-	-	-	30	100
AMX	-	-	1	-	30	100
P	-	-	2	6.7	28	93.3
AM	1	3.1	3	10.0	26	86.7
S	2	6.2	7	23.3	21	70.0
SXT	5	15.6	8	30.0	17	56.7
NA	6	18.8	8	33.3	16	53.3
T	8	25.0	10	30.0	15	50.0
NOR	13	40.6	10	26.7	13	43.3
C	15	46.9	9	16.7	12	40.0
CP	20	62.5	5	20.0	8	26.7
K	21	65.6	5	13.3	5	16.7
N	24	75.0	3	16.7	3	10.0
G	29	90.6	2	3.33	2	6.7

E (Erythromycin), AMX (Amoxicillin), P (Penicillin), AM (Ampicillin), S (Streptomycin), SXT (Sulphamethoxazol), NA (Nalidixic acid), T (Oxytetracycline), NOR (Norfloxacin), C (Chloramphenicol), CP (Ciprofloxacin), K (Kanamycin), N (Neomycin), G (Gentamicin)

The results revealed in table (2) that the isolated *E. coli* strains were highly sensitive to Gentamicin (G) 90.6 % Neomycin (N) 75%, Kanamycin (K) 65.6%, Chloramphenicol (C) 46.9% and

Table (3): Percentages of Antimicrobial susceptibility of *E. coli* strains isolated from the examined samples of meat products (n=32)

No	*E. coli* serovars	Antimicrobial resistance profile	MAR index
1	O26 : H11	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K, N	0.928
2	O26 : H11	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP	0.786
3	O26 : H11	E, AMX, P, AM, S, SXT, NA, T	0.571
4	O26 : H11	E, AMX, P, AM, S, SXT	0.428
5	O26 : H11	E, AMX, P, AM, S	0.357
6	O26 : H11	E, AMX, P, AM	0.286
7	O26 : H11	E	0.071
8	O111 : H2	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K, N, G	1.000
9	O111 : H2	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K, N	0.928
10	O111 : H2	E, AMX, P, AM, S, SXT, NA, T, NOR	0.643
11	O111 : H2	E, AMX, P, AM, S, SXT, NA, T	0.571
12	O111 : H2	E, AMX, P, AM, S, SXT, NA	0.500
13	O111 : H2	E, AMX, P, AM	0.286
14	O111 : H2	E, AMX, P	0.214
15	O128 : H2	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K, N	0.928
16	O128 : H2	E, AMX, P, AM, S, SXT, NA, T, NOR, C	0.714
17	O128 : H2	E, AMX, P, AM, S	0.357
18	O128 : H2	E, AMX	0.143
19	O55 : H7	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K	0.857
20	O55 : H7	E, AMX, P, AM, S, SXT, NA, T	0.571
21	O55 : H7	E, AMX, P, AM, S, SXT, NA	0.286
22	O125 : H21	E, AMX, P, AM, S, SXT, NA, T, NOR, C, CP, K, N	0.714
23	O125 : H21	E, AMX, P, AM, S, SXT, NA	0.500
24	O125 : H21	E, AMX, P, AM	0.286
25	O114 : H21	E, AMX, P, AM, S, SXT, NA, T	0.571
26	O114 : H21	E, AMX, P, AM	0.286
27	O124	E, AMX, P, AM, S, SXT, NA, T	0.357
28	O124	E, AMX, P, AM, S	0.286
29	O86	E, AMX, P, AM, S	0.286
30	O104	E, AMX, P, AM, SXT, NA	0.500
31	O119 : H4	E, AMX, P, AM	0.286
32	O167 :H21	E, AMX, P	0.143
		Average	0.515

Ciprofloxacin (CP) 62.5%. On the other hand, were resistant to Erythromycin (E) 100%, Amoxicillin (AMX) 96.9%, Penicillin (P) 93.8%, Ampicillin (AM) 87.5%. Streptomycin (S) 71.9%, on contrast *E. coli* strains were Application of sensitivity test on all *E. Coli* Strains indicated that most of them were multiple antimicrobial resistance (MAR) where the MAR index equal 0.515 as shown in table (3).

4. DISCUSSION

The presence of *E. coli* in contaminated food products is commonly attributed to fecal contamination when they are improperly handled and/or when inactivation treatments fail. The adaptation of E. coli at low pH and low levels can vary at different temperatures depending on the serotype (Valero et al., 2010). The current results for the examined samples of kofta were nearly similar to those obtained by Abdalla and Hassan (2000) (40%), Torky (2004) (30%), and shawish (2015) (36%), but lower than those obtained by Hazarika

et al. (2007) (27.6%), Nadim (2016) (28%). On the other hand, higher result was obtained by El-Mossalami (2003) (50%). While, the current results for the examined samples of beef burger were higher than those obtained by Fathi *et al.* (1994) (77.78%) and El-Mossalami (2003) (35%) and lower than those obtained by Gomez *et al*. (2002) (8.8%), El-Sherif (2009) (10%) and El-Dosoky *et al*. (2013) (10%), but similar to those obtained by ouf (2001) (30%), shawish (2015) (28%) and Nadim (2016) (24%). Regarding to these results we could conclude that variation between results of kofta and beef burger this might be mainly attributed to the manner of handling each product, the number of processing operations that the product subjected to them, amount of post processing contamination and storage condition and shelf life of each product.

5. REFERENCES

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