



Occurrence of *Escherichia coli* in Fast Foods at Restaurant level

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ABSTRACT

A grand total of 90 random samples of fast foods (ready-to-eat) represented by kofta, hawawshi and liver (30 of each) were collected from different fast food services in different districts in Menofia governorate. The incidences of *E.coli* in the examined samples of fast foods were 26.67%, 30% and 43.33% for sandwiches of kofta, hawawshi and liver, respectively. Moreover, the isolated serotypes of *E.coli* from the examined samples of fast foods were O₂₆ : H₁₁ ,O₄₄ : H₁₈ ,O₅₅ : H₇ , O₉₁ : H₂₁ ,O₁₀₃ ,O₁₁₁: H₄ ,O₁₁₃ : H₄ ,O₁₁₉ : H₄ , O₁₂₄ ,O₁₂₅ : H₂₁ ,O₁₂₇ : H₆ and O₁₂₈ : H₂ with various percentages .Also, The application of sensitivity test on all the isolated *E.coli* strains indicated that most of them were multiple antimicrobial resistant (MAR) ,where the MAR index equal 0.538.The public health significance of the isolated organisms from fast foods was discussed as well as some recommendations to ensure safety and quality of meat sandwiches prepared in fast food services were outlined.

Keywords: Fast foods, kofta, hawawshi, liver, MAR, *E.coli*.

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1. INTRODUCTION

Fast food is the term given to food that can be prepared and served very quickly. While any meal with low preparation time can be considered to be fast foods. Ready-to-eat (RTE) foods are processed foodstuffs which have gained popularity in recent times because they can be ingested without further thermal treatments (Rodriquez *et al.*, 2010.) They are highly demanded due to their reasonable price, agreeable taste and easily serving (Mosupy *et al.*, 1998). In Egypt, the most ready - to - eat sandwiches sold in street vendors and fast food restaurants are kofta, liver and El- Hawawshi. In recent years, *E.coli* has become recognized as a serious food borne pathogen and has been associated with numerous outbreaks of disease in the UK, Japan and USA (Scotter *et al.*, 2000). *Escherichia 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 fast food sandwiches by isolation and identification of *Escherichia coli* from the examined samples of fast foods and detection of antibiotic sensitivity of the isolated strains of *Escherichia coli*.

2. MATERIAL AND METHODS

2.1. Collection of samples

Ninety random samples of fast foods represented by kofta, hawawshi and liver (30 of each) were collected from different restaurants at various localities in Menofia governorate. The examined samples were kept in separated sterile plastic bags and preserved in an ice box. All the examined samples were subjected to bacteriological examinations to isolate *E.coli* and investigate its antibiotic sensitivity.

2.2. Preparation of samples

Ten grams of the examined samples were aseptically transferred to aseptic blender jar and 90 ml of 0.1 % sterile buffered peptone water 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 dilutions were prepared.

2.3. 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, biochemically and serologically identified.

2.4. 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.

2.5. 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 fast foods were 26.67%, 30% and 43.33% for sandwiches of kofta, hawawshi and liver, respectively. Also, data in table (2) revealed that the serologically identified *E.coli* isolates in the examined samples of kofta sandwiches were O₂₆ : H₁₁ (3.33%) , O₁₁₁:H₄ (10.00%) , O₁₁₉ :H₄ (6.67%), O₁₂₄ (3.33%) and O₁₂₈ :H₂ (3.33%) ,while in the examined samples of hawawshi sandwiches O₂₆ : H₁₁ (6.67%) , O₅₅ : H₇ (3.33%), O₉₁ : H₂₁(3.33%), O₁₁₁:H₄ (6.67%) and O₁₂₇:H₆ (10.00%) were identified. Moreover, in the examined samples of liver sandwiches O₂₆ :

H₁₁ (13.33%), O₄₄: H₁₈ (3.33%), O₁₀₃ (3.33%) , O₁₁₁: H₄ (10.00%), O₁₁₃: H₄ (3.33%), O₁₂₅: H₂₁ (3.33%) and O₁₂₈: H₂ (6.67%) .

The results in table (3) revealed that the isolated *E.coli* strains were highly resistant to Penicillin (P) 100%, Erythromycin (E) 100% and Amoxicillin (AMX) 93.3% .On contrast, *E.coli* strains were sensitive to Gentamicin (G) 90.0%, Kanamycin (K) 73.3% and Chloramphenicol (C) 70.0%. Application of sensitivity test on all the isolated *E.coli* strains indicated that most of them were multiple antimicrobial resistances (MAR) where the MAR index equal 0.538 as shown in table (4).

Table (1): Incidence of *E.coli* in the examined samples of fast foods (n=30).

Products	Positive Samples	
	No.	%
kofta	8	26.67
Hawawshi	9	30
liver	13	43.33
Total	30	33.33

4. DISCUSSION

The presence of *E.coli* in food of animal origin is considered as indicator of faults during preparation, handling, storage or service (Tabbut, 1999). Although *E.coli* is readily killed by temperature above 55°C, serious incidents occurred in such products, which reflect high level of abusing either due to fecal contamination or cross contamination between raw and cooked food (Varnam and Evans, 1991). The current results of the examined samples of hawawshi sandwiches were higher than those obtained by Ibrahim-Ghada (2001) (27.2%), Ismail-Soad (2006) (17.3%), and El- Rayes Amina (2008) (16%), but lower than those obtained by Al-Tawwab (2004) (64%). While the current results for the examined samples of kofta sandwiches were higher than those

Table (2): Serotyping of *E.coli* isolated from the examined samples of fast foods (n=30).

<i>E.coli</i> strains	kofta		Hawawshi		Liver		Strain Characteristics
	No.	%	No.	%	No.	%	
O26: H11	1	3.33	2	6.67	4	13.33	EHEC
O44:H18	-	-	-	-	1	3.33	EPEC
O55: H7	-	-	1	3.33	-	-	EPEC
O91: H21	-	-	1	3.33	-	-	EPEC
O103	-	-	-	-	1	3.33	EHEC
O111: H4	3	10	2	6.67	3	10	EHEC
O113: H4	-	-	-	-	1	3.33	EPEC
O119: H4	2	6.67	-	-	-	-	EPEC
O124	1	3.33	-	-	-	-	EIEC
O125: H21	-	-	-	-	1	3.33	ETEC
O127:H6	-	-	3	10	-	-	ETEC
O128:H2	1	3.33	-	-	2	6.67	ETEC
Total	8	26.67	9	30	13	43.33	

Table (3): Percentages of Antimicrobial susceptibility of *E. coli* strains isolated from the examined samples of fast foods (n=30).

Antimicrobial agent	S		I		R	
	NO.	%	NO.	%	NO.	%
Penicillin (P)	-	-	-	-	30	100
Erythromycin (E)	-	-	-	-	30	100
Amoxicillin(AMX)	-	-	2	6.7	28	93.3
Streptomycin (S)	1	3.3	3	10.0	26	86.7
Ampicillin (AM)	2	6.7	7	23.3	21	70.0
Sulphamethoxazol (SXT)	4	13.3	9	30.0	17	56.7
Nalidixic acid (NA)	4	13.3	10	33.3	16	53.3
Norfloxacin (NOR)	6	20.0	9	30.0	15	50.0
Oxytetracycline (T)	9	30.0	8	26.7	13	43.3
Ciprofloxacin (CP)	13	43.3	5	16.7	12	40.0
Neomycin (N)	16	53.3	6	20.0	8	26.7
Chloramphenicol (C)	21	70.0	4	13.3	5	16.7
Kanamycin (K)	22	73.3	5	16.7	3	10.0
Gentamicin (G)	27	90.0	1	3.33	2	6.7

S: Sensitive. I: Intermediate. R: Resistant

obtained by Hassan (1991) (0%), El-Taher- Omya (1998) (25%) and El-Rayes-Amina (2008) (20%) and lower than those obtained by Al-Tawwab (2004) (64%), but similar to those obtained by Al-Mutairi (2011) (28%). The variations in the results may be due to the differences in

manufacture practices, handling from producers to consumers and the effectiveness of hygienic measures applied during production. Therefore, *E.coli* is considered as an indicator of fecal contamination, besides, it may induce severe diarrhea in infants and young

Table (4): Antimicrobial resistance profile of *E. coli* strains isolated from the examined samples of fast foods (n=30).

NO	<i>E.coli</i> serovars	Antimicrobial resistance profile	MAR index
1	O111 : H4	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N, C, K, G	1
2	O111 : H4	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N, C	0.857
3	O111 : H4	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N	0.786
4	O111 : H4	P, E, AMX, S, AM, SXT, NA, NOR, T, CP	0.714
5	O111 : H4	P, E, AMX, S, AM, SXT, NA, NOR, T	0.643
6	O111 : H4	P, E, AMX, S, AM	0.357
7	O111 : H4	P, E, AMX, S	0.286
8	O111 : H4	P, E, AMX	0.214
9	O26 : H11	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N, C, K, G	1
10	O26 : H11	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N	0.786
11	O26 : H11	P, E, AMX, S, AM, SXT, NA, NOR, T, CP	0.714
12	O26 : H11	P, E, AMX, S, AM, SXT, NA	0.500
13	O26 : H11	P, E, AMX, S, AM	0.357
14	O26 : H11	P, E, AMX	0.214
15	O26 : H11	P, E	0.143
16	O127 : H6	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N, C, K	0.928
17	O127 : H6	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N	0.786
18	O127 : H6	P, E, AMX, S, AM	0.357
19	O128 : H2	P, E, AMX, S, AM, SXT, NA, NOR, T, CP, N, C	0.857
20	O128 : H2	P, E, AMX, S, AM, SXT, NA, NOR	0.571
21	O128 : H2	P, E, AMX, S	0.286
22	O119 : H6	P, E, AMX, S, AM, SXT, NA, NOR, T, CP	0.714
23	O119 : H6	P, E, AMX, S	0.286
24	O91 : H21	P, E, AMX, S, AM, SXT, NA, NOR, T, CP	0.714
25	O44 : H18	P, E, AMX, S, AM, SXT, NA, NOR	0.571
26	O103	P, E, AMX, S, AM, SXT	0.428
27	O125 : H21	P, E, AMX, S, AM	0.357
28	O55 : H7	P, E, AMX, S	0.286
29	O113 : H4	P, E, AMX, S	0.286
30	O124	P, E	0.143

children, as well as food poisoning and gastroenteritis among adults (Synge, 2000). The results indicated that the isolated *E.coli* strains were highly resistant to Penicillin (P) 100%, Erythromycin (E) 100% and Amoxicillin (AMX) 93.3%. On contrast, *E.coli* strains were sensitive to Gentamicin (G) 90.0%, Kanamycin (K) 73.3% and Chloramphenicol (C) 70.0%.

It can be concluded that the presence of *E.coli* in large numbers not only renders these sandwiches of inferior quality and unfit for human consumption, but also as an indication for the fecal contamination and possibility of presence of associated enteric pathogens. Moreover, The application of

sensitivity test on all the isolated *E.coli* strains indicated that most of them were multiple antimicrobial resistant (MAR), where the MAR index equal 0.538.

5. REFERENCES

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