PASTRY FOODS AS POTENTIAL SOURCE OF PATHOGENIC E.COLI

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A B S T R A C T

A total of 90 random samples of ready to-eat-pastry foods of meat pie, meat pizza and pasta pashamil. 30 samples of each were collected from different fast foods services at Kalyobia governorate to be examined bacteriologically for detection of pathogenic Escherichia coli microorganisms. The obtained results indicate that incidence of E.coli isolated from examined samples of pastry foods were 20 %, 26.76 %, 36.67% of meat pizza, meat pie and pasta pashamil respectively. Concerning Enterohaemorrhagic E.coli strains O26 and O111 H4 incidence were 3.33% and 6.67%in meat pizza while Enterohaemorrhagic E.coli O111 H4 incidence were 10 % in meat pie but the incidence of Enterohaemorrhagic strains O26 and O111 H4 were 10% and 6.67% in pasta pashamil respectively. Enteropathogenic E.coli strains O44 H18 incidence were 3.33% in meat pizza samples while Enteropathogenic E.coli strains O55 H7, O114 H21 and O119 H6 were 3.33% in meat pie samples. The incidence of Enteropathogenic E.coli strains O114H21 and O119 H6 were 3.33% in pasta pashamil. The incidence of toxigenic E.coli O127H6 were 6.67% in meat pizza while in pasta pashamil was 10.00%.Enteroinvasive E.coli O124 incidence in meat pie was 6.67% but in pasta pashamil its incidence was 3.38%.The public health significance of isolated organisms from the examined ready-to-eat pastry foods was discussed as well as some recommendations to ensure the safety and the quality of meat pie, meat pizza and pasta pashamil prepared in fast foods services were outlines.

Keywords: Pastry foods, E.coli, fast foods

1. INTRODUCTION

Concerning the field of meat fast foods and pastry restaurants E.coli was found to dominate in raw meat handling subsequent to service contamination accompanied with variable hygienic conditions of manufacturing fresh meat products, Bryan, (1988). Moreover sources of contamination with E.coli are hands of staff, primary habitat of E.coli in gastrointestinal tract of mammals and (outcome of fecal contamination occurs), foods utensils, air, soil and unclean vegetables. Ready prepared foods are fried and held at room temperature for considerable period of time and later reheated without reaching the prescribed temperature, thus the existing microorganisms reach high levels sufficient to produce food -borne diseases (Primo et al. 1993). Therefore the objectives of the present study was directed to find the level of contamination of different pathogenic E.coli groups in ready-to-eat meat pastry products (meat pie, meat containing pizza and pasta pashamil) and, the following items were detailed.

- Isolation of E.coli from the examined samples of pastry foods.
• Identification of the different serotypes of pathogenic *E.coli* isolated from the examined samples of pastry foods.

• Demonstration of *E.coli* in pastry foods by application of ELISA technique.

• Interpretation of the action of antimicrobial discs on the isolated *E.coli* strains.

2. MATERIALS AND METHODS

2.1. Samples:

Ninety random samples of pastry foods represented by meat pizza, meat pie and pasta pashamil (30 of each) were collected from different restaurants in Benha city, Kalyobia governorate, Egypt. The collected samples were subjected to the bacteriological examination to detect pathogenic *E.coli* in such examined pastry foods.

2.2. Screening of *E.coli*

Preparation of samples was applied according to (International commission of Microbiological Specification for Foods "ICMSF" 1996) from the original dilution, 1ml was inoculated into MacConkey, broth tubes supplemented with inverted Durham, s tubes. The inoculated tubes were incubated at 37°C for 24 hours. Loop from positive MacConkey, broth tubes were separated streaked onto Eosin Methylene Blue agar plates (EMB) which were then incubated at 37°C for 24 hours. Suspected colonies were metallic green on color. Suspected colonies were purified and inoculated into slope nutrient agar tubes for further identification.

2.3. Morphological examination

Identification of *E.coli* by application gram staining (Cruickshank et al., 1975) and motility test. (Collin and Lyne1984).

2.4. Biochemical identification

It was carried out

• Indole production test (Kovacs, 1928).
• Methyl red test (Ljutov, 1961).
• Voges-praskauer test (Ljutov, 1963).
• Citrate utilization test (Simmon, 1926).
• Gelatin hydrolysis test (Collins and lyne, 1984).
• Hydrogen Sulphide production test (Macfaddin, 1976).
• Oxidation- fermentation test (Hugh and Leifisol, 1953).
• Urease test (Edwards and Ewing, 1986).
• Arginine hydrolysis (Collins and lyne, 1984).
• Eijkman test (Collins and lyne, 1984).
• Nitrate reduction test (Collins and lyne, 1984).
• Fermentation of sugars (Macfaddin,1976)

2.5. Serological identification

Isolates were serologically identified according to Koch et al. (1996) by using rapid diagnostic E.coli sets (DENKA SEIKEN CO., Japan) for diagnosis of Enteropathogenic types. Two separate drops of saline were put on a glass slide and a portion of the colony from the suspected culture was emulsified with the saline solution to give a smooth fairly dense suspension. To one suspension, control, one loop of saline was added and mixed. To the other suspension one loop of undiluted antiserum was added and titled back and forward for one minute. Agglutination was observed using indirect lighting over a dark background. When a colony gave a strongly positive agglutination with one of the pools of polyvalent serum, a further portion of it was inoculated onto a nutrient agar slant and incubated at 37°C for 24 hours to grow as a culture for testing with mono-valent sera.

A heavy suspension of bacteria from each slope culture was prepared in saline, and slide agglutination tests were performed with the diagnostic sera to identify the O-antigen.
2.6. Statistical Analysis

The obtained results were statistically evaluated by application of Analysis of Variance (ANOVA) test according to Feldman, et al. (2003).

3. RESULTS

It is evident from the results recorded in table (1) that *E. coli* was isolated from 20%, 26.67 and 36.67% in the examined samples of meat pizza, meat pie and pasta pashamil, respectively. Totally 27.78% of the examined samples of pastry foods were contaminated with *E.coli*

Table (1): Incidence of *E. coli* organisms isolated from the examined samples of pastry foods (n=30).

<table>
<thead>
<tr>
<th>Pastry food</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat pizza</td>
<td>6</td>
<td>20.00</td>
</tr>
<tr>
<td>Meat pie</td>
<td>8</td>
<td>26.67</td>
</tr>
<tr>
<td>Pasta pashamil</td>
<td>11</td>
<td>36.67</td>
</tr>
<tr>
<td>Total (90)</td>
<td>25</td>
<td>27.78</td>
</tr>
</tbody>
</table>

Table (2): Serotyping of *E. coli* organisms isolated from the examined samples of Meat pizza (n=30)

<table>
<thead>
<tr>
<th><em>E. coli</em> Strains</th>
<th>Meat pizza Strain characteristics No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>O26</td>
<td></td>
<td>3.33</td>
</tr>
<tr>
<td>O44:H18</td>
<td></td>
<td>3.33</td>
</tr>
<tr>
<td>O111:H4</td>
<td></td>
<td>6.67</td>
</tr>
<tr>
<td>O127:H6</td>
<td></td>
<td>6.67</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

EPEC= Enteropathogenic *E. coli*  ETEC = Enterotoxigenic *E. coli*  EHEC = Enterohaemorrhagic *E. coli*

Results achieved in table (2) that the isolated *E.coli* was serotyped from the examined samples of meat pizza as O26 (3.33%) EHEC Enteropathogenic *E. coli* O44 H18 (3.33%) EPEC and O111 H4 (6.67%) EHEC and O127 H6 (6.67%) ETEC (Enterotoxigenic).

Table (3) has given that *E.coli* was serotyped from the examined samples of meat pie as O55:H7 (3.33%) EPEC, O111 H4 (10.00%) EHEC, O114 H21 (3.33%) EPEC, O119 H6 (3.33%) EPEC and O124 (6.67%) EIEC (Entero-invasive) *E.coli*.

Table (3): Serotyping of *E. coli* organisms isolated from the examined samples of Meat pie (n=30)

<table>
<thead>
<tr>
<th><em>E. coli</em> Strains</th>
<th>Meat pie Strain characteristics No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>O55:H7</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O111:H4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>O114:H21</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O119:H6</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O124</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

EPEC= Enteropathogenic *E. coli*  ETEC = Enterotoxigenic *E. coli*  EHEC = Enterohaemorrhagic *E. coli*

Table (4): Serotyping of *E. coli* organisms isolated from the examined samples of Pasta pashamil (n=30)

<table>
<thead>
<tr>
<th><em>E. coli</em> Strains</th>
<th>Pasta pashamil Strain characteristics No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>O26</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>O111:H4</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>O114:H21</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O119:H6</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O124</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>O127:H6</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

EPEC= Enteropathogenic *E. coli*  ETEC = Enterotoxigenic *E. coli*  EHEC = Enterohaemorrhagic *E. coli*.

4. DISCUSSION

Pastry foods have been described as commercially prepared ready-to cook (RTC) and ready to-eat foods containing major ingredients from two or more categories, the combination of these ingredients into a single products presents not only the original hazards of each ingredient but also the possibility of additional hazards due to further handling, processing or modification of the environment, National academy of
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sciences (NAS). (1985). Table one gives the incidence of *E.coli* organisms isolated from the examined samples of pastry foods.

Actually, *E.coli* was previously isolated from fast foods by Chibber et al. (1990) was examined one hundred and one (101) samples from meat, food handlers and equipments, they found that 24.8% were enterotoxegenic *E.coli*. Bensink and Bothman (1991) Concluded that about 10% of the four hundreds (400) meat samples were contaminated with *E.coli*. Mousa et al., (1993) Isolated *E.coli* from 33% of examined samples of minced meat with difference percentages.

However *E.coli* have probably received more attention than the most groups of bacteria in meat for their significance as indicator organisms of fecal contamination and their ability to grow well over wide range of temperature below 10oc up to 46oc.


Tables 2, 3 and 4 give serotyping of *E.coli* organisms isolated from examined samples of meat pizza, meat pie and pasta pashamil respectively. *E.coli* classified according to serotypes into Bryan (1982), Enterotoxigenic *E.coli* (ETEC) cells adhere to epithelial cells and produce toxin but do not invade epithelial cells. The predominant sero-groups are O6, O8, O11, O15, O20, O25, O27, O78, O128, O148, O149, O159, and O173. Enteropathogenic *E.coli* (EPEC) cells adhere to epithelial cells intimately, produce attachment/effacement lesion and are invasive; however, they do not produce toxin. The notable sero-groups are O55, O86, O111, O119, O125, O126, O127, O128, and O142. Enterohaemorrhagic *E. coli* (EHEC) also binds strongly to epithelial cells, produce attachment/effacement lesions and produce toxins. The serogroups are O4, O5, O16, O26, O55, O111ab, O113, O117, O157, and O172. Several recently identified serogroups belong to EHEC include O176, O177, O178, O180, and O181.

Enteroaggregative *E.coli* (EAEC) adheres to epithelial cells, form aggregates, produce toxin, but do not invade. Virotype O3, O15, O44, O86, O77, O111 and O127.

Enteroinvasive *E.coli* (EIEC) cells also adhere, invade cells, and move from cell-to-cell, but do not produce toxin. The pathogenicity of EIEC resembles infection caused by *Shigellas* pp. And the predominant symptom is dysentery. The EIEC serogroups are O28, O29, O112, O124, O136, O143, O144, O152, O159, O164, and O167.

The diffusely adhering *E. coli* (DAEC) cells adhere to epithelial cells, but they neither invade nor produce toxin.

5. REFERENCES


Cruickshank, R., Duguid, J.P., Marmion, B.P., Swain, R.H.A. 1975. Medical
Pastry foods as potential source of pathogenic *E. coli*


معجنات الأغذية كمصدر محتمل لإصابة بМИكروبات الايشفيرشيا كولاي.

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الملخص العربي

تم جمع 90 عينة عشوائية من البيتزا وفطائر اللحم و المكرونة البشاميل من أماكن مختلفة تجهيز الوجبات السريعة بالطريق البري وواقع 30 عينة من كل نوع وقد تم تقلل هذه العينات علي وجة السرعة و تحت ظروف صحية مشددة علي المعمل لمنع التدخل البكيري لها من حيث نسبة الايشفيرشيا كولاي وقد أوضحت النتائج أن المتوسط نسبة ميكروب الايشفيرشيا كولاي العوزة من العينات المختبرة هو 20% و 6.76% و 26.76% من البيتزا وفطائر اللحم والمكرونة البشاميل على التوالي. وقد وجد أن عبارة الانثيوروكوبنتوس ايشفيرشيا كولاي والتي تم عزلها من البيتزا النمط المصلى H4 O111 بنسبة 3.33% و 6.76% عبارة العطرة والتي تم عزلها من فطائر اللحم ولكن النمط المصلى H4 O111 بنسبة 10 % على التوالي بينما وجد أن نفس العطرة والتي تم عزلها من فطائر اللحم ولكن النمط المصلى H4 O26 بنسبة 10 % و 6.67 % في عينات المكرونة البشاميل علي التوالي. وقد وجد أن عبارة الانثيوروكوبنتوس ايشفيرشيا كولاي والتي تم عزلها من البيتزا النمط المصلى H18 O44 بنسبة 3.33% في عينات O55 H7 O114 H21 O119 H6 H6 O114 بنسبة 3.33% في عينات في عينات المكرونة البشاميل نتيجة لوجود عبارة المكلفة من البيتزا المختبرة كلاً من عبارة البيتزا النمط O127 H6 H10 ، عبارة الانثيوروكوبنتوس ايشفيرشيا كولاي O114 وجدت بنسبة 6.67% في عينات فطائر اللحم و بنسبة 3.33% في المكرونة البشاميل. وقد أوضحت النتائج أنه تم عزل ميكروب ايشفيرشيا كولاي الممرضة بنسبة مختلفة من العينات المختبرة و تم تصنيف العوائط التي تم عزلها كلاً من H4 O111 H7 O55 O26 O44 H18 O127 H6 H10 عبارة البيتزا النمط O119 H6 H21 H4 O111 O119.

وقد تم دراسة ومتابعة الأمهية الصحية للعوائط التي تم عزلها وكذلك الشروط الصحية

الواجب توافرها أثناء اعداد و تقديم هذه الوجبات للتجنب هذه الميكروبات.

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