Bacterial Contamination of Ready to Eat Foods (Shawerma Sandwiches) in Misurata City, Libya

Abdalhamid S. Alhaddad, Faraj A. Abushaala and, Ali A. Bahout

Abstract— Fifty random Samples of Shawerma Sandwiches were collected from different fast food restaurants in Misurata City, Libya and Subjected to bacteriological examination to evaluate their hygienic quality.

The mean Counts/g of examined samples for total colony, *Staphylococcus aureus, Bacillus cereus, Coliforms and Clostridium perfringens* were $8.4 \times 10^5, 8.3 \times 10^3, 6.5 \times 10^2, 4.3 \times 10^3$ and $1.2 \times 10^2$ respectively.

*Enterobacter aerogenes, E.coli, Ent. cloacae, Klebsiella freundii* were isolated in a varying Percentages. While, *Salmonella spp.* could not be detected. The Public health importance for isolated microorganisms as well as suggestive Sanitary measures for improving the quality of ready to eat foods and to safeguard the consumers from infection were discussed.

Keywords— Food contamination, Bacterial contamination, Shawerma Sandwiches and Ready foods contamination.

I. INTRODUCTION

CONSUMPTION of contaminated ready to eat foods including red meat, eggs, cheese & vegetables have been documented to serve as vehicles for transmission of several bacterial pathogens and food-borne outbreaks (Borch & Arinder, 2002).

Hot foods have been the source of outbreaks of *Staphylococcus aureus, Clostridium perfringens & Salmonella enteritidis* (Hatakka, 1998).

The main sources of pathogenic bacteria in food are contaminated raw food, food handlers, dust, water, utensils & insects (Ray, 1996).

Ready to eat food has been implicated in cases of food poisoning or gastroenteritis in human beings (Eley, 1996).

Shawerma is a type of grilled meat loafs characterized by its palatability & accepted low price. In Misurata, showerma sandwiches are the most popular ready to eat foods, which are prepared. From chicken meat, vegetables, spices & bread and sold in fast food restaurants.

The ready to eat foods must be examined at regular intervals in order to assess their microbiological quality as the microbial quality of ready to eat food reflects its sanitary condition during its production & distribution (Hubbert et al., 1996). Therefore, this work was planned to evaluate the bacteriological condition of ready to eat food (Shawerma Sandwiches) sold in Misurata city, Libya.

II. MATERIAL & METHODS

A. Collection of samples

Fifty random samples of ready to eat food (Shawerma Sandwiches), each weighting approximately 200g were collected from different fast food restaurants in Misurata city, Libya between September & December 2010.

B. Collected samples were transferred, without delay to the laboratory under strict hygienic measures & subjected to bacteriological examination.

C. Preparation of samples

90 ml of peptone water (0.1%) were added to 10 grams of each sample & thoroughly mixed by a blender for 2 minutes. Ten fold serial dilutions were prepared.

D. Bacteriological examination

Total colony, Coliforms, *Staphylococcus aureus, Bacillus cereus & Cl. perfringens* counts /g were determined according to A.P.H.A. (1985). Subjected colonies of *Staph. aureus, Cl. perfringens, Coliforms & B. cereus* were isolated, purified & identified according to Krieg & Holt (1984). Isolation of salmonella species was carried out according to Cowan & Steel (1993).

III. RESULTS AND DISCUSSION

The results reported in Table (1) declare that the total bacterial count/g of Shawerma Sandwiches samples ranged from $2.8 \times 10^4$ to $6.9 \times 10^6$ with a mean value of $8.4 \times 10^5$. Nearly similar counts were reported by EL- Shater et al., (2001) & Sameer et al., (2008).

The total bacterial count is considered as index of sanitary...
& quality of foods (Forsythe & Hayes, 1998).

*Staphylococcus aureus* was detected in 28.0% of examined samples with a mean value of 8.3 x 103 /g (range 2.4 x 102 – 1.3 x 105).


Presence of *Staph. aureus* in food indicates shortage in the hygiene of production. Moreover, such organisms may take the chance to multiply in the product during storage & produce their enter toxins which constitute a public health hazard (Staphylococal food poisoning) to the consumers (Ray, 1996).

Bacillus cereus was isolated from 12% of the examined samples with a count ranged from 1.9 x 102 to 5.1 x 103 & mean value 6.5 x 102 /g (Table, 1).

Higher results were reported by EL-shater *et al.* (2001) & Sameer *et al.* (2008). B. cereus is considered important indicator organism for hygienic condition of food (ICMSEF, 1996). Also, B. cereus was recognized as a food poisoning pathogen & could produce diarrhea and vomiting toxins (Eley, 1996).

Table (1) revealed that coliforms could be detected in 20% of examined samples with a mean value of 4.3 x 103/g (range 4.6 x 102 – 2.7 x 104). Higher levels were obtained by EL-shater *et al.*, (2001) & Sameer *et al.* (2008).

Enterobacter aerogenes, E.coli , Enterobacter cloacae, klebsiella pneumoniae & Citrobacter freundii could be isolated from 10% , 8%, 6%, 4% & 4% of examined samples respectively (Table, II). Similar species of coliforms were isolated by EL-shater *et al.* (2001) & Sameer *et al.* (2008).

The presence of coliforms in examined samples may constitute a public health hazard (Robinson, 1990).

The presence of *E.coli* in the food is considered factor of faecal contamination beside they induce severe diarrhoea in infants & young children as well as cases of food poisoning & gastroenteritis among consumers. (Eley, 1996).

Table (1) showed that 10% of examined samples were contaminted with Cl. perfringens. The maximum count /g was 3.1 x102, the minimum count was 80, with a mean value of 1.2 x 102.

These results agreed with those of Hatakka (1998).

Clostridium perfringens was responsible for food poisoning among courumers due to consumption of certain food products (Eley, 1996).

Salmonella spp. Failed to be detected in examined samples (Table, I). These results were supported by Sameer *et al.*, (2008).

### IV. Conclusion

The results of this investigation indicate that some of the ready to eat food samples collected from different fast food restaurants in Misurata were of poor sanitary quality & may pose a considerable risk to human health.

In conclusion, using of high quality raw materials, efficient heat treatment, adequate cleaning & sanitization of utensils day-by- day observance of proper personal, food handling of cooked food & lastly adequate education of food hygiene should be done. Also, strict hygienic measures should be applied during preparation of ready to eat food to improve the quality of the product & to safeguard the consumers.

### TABLE I

<table>
<thead>
<tr>
<th>Bacterial Counts</th>
<th>Positive samples No.</th>
<th>Count (cfu/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Total bacterial</td>
<td>50 100.0</td>
<td>2.8 x 104</td>
</tr>
<tr>
<td><em>Staph. aureus</em></td>
<td>14 28.0</td>
<td>2.4 x 102</td>
</tr>
<tr>
<td><em>Coliforms</em></td>
<td>10 20.0</td>
<td>4.6 x 102</td>
</tr>
<tr>
<td><em>B. cereus</em></td>
<td>6 12.0</td>
<td>1.9 x 102</td>
</tr>
<tr>
<td><em>Cl. Perfringens</em></td>
<td>5 10.0</td>
<td>3.1 x 102</td>
</tr>
<tr>
<td><em>Salmonellae</em></td>
<td>0 0.0</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE II

<table>
<thead>
<tr>
<th>Isolates</th>
<th>No. of samples</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staph. aureus</em></td>
<td>18</td>
<td>36.0</td>
</tr>
<tr>
<td><em>B. cereus</em></td>
<td>7</td>
<td>12.0</td>
</tr>
<tr>
<td>Enterobacter aerogenes</td>
<td>18</td>
<td>36.0</td>
</tr>
<tr>
<td><em>E. coli</em></td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>Citrobacter freundii</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td><em>Cl. perfringens</em></td>
<td>3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

### References


