BS. VET. MED. J. NOVEMBER 2007, 5TH SCIENTIFIC CONFERENCE, P. 73-78

Beni-Suef Veterinary Medical Journal

Prevalence of Salmonella and E.coli O_{157} in some foods

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A total of 200 raw food samples including milk, kareish cheese, fresh sausage and hawawshy (spiced minced meat) (Fifty of each) were randomly collected from farmer's houses, butcher's shops and retail markets in Beni-Suef Governorate. All were screened for the presence of E.coli O_{157} and Salmonella. E.coli O_{157} could be detected in 1 (2%) and 1 (2%) of kareish cheese and sausage samples, respectively, while it could not be detected in any of milk or hawawshy samples. Salmonella were detected in 2 (4%), 2 (4%) and 1 (2%) of kareish cheese, sausage and hawawshy samples, respectively, while they could not be recovered from the examined milk samples. The isolated serotypes from kareish cheese samples were S.menden and S.allerton, while two strains of S.III arizonae were isolated from sausage samples, but S.anatum was recovered from hawawshy samples. The public health significance of isolated strains as well as suggested control measures were discussed.

Salmonella and E.coli O_{157} are two of the most common agents of food borne illness in humans (Buzby *et al.,* 1996). *E.coli O_{157} and Salmonella* have been isolated from beef and dairy cattle at all stages of production, and although their shedding are intermittent and can be difficult to detect, these bacteria appear to be fairly widespread throughout the bovine population (Fedorka- Cray *et al.,* 1998; Hancock *et al.,* 1998; Elder *et al.,* 2000).

E.coli O_{157} was first recognized as food borne pathogen in 1982 (Riley *et al.,* 1983). Since that, it has become a pathogen of major concern in both food and dairy industries, because of its ability to cause severe illness, in particular, hemorrhagic colitis, hemolytic uremic syndrome and thrombotic thrombocytopenic purpura (Abdul-Raouf *et al.,* 1993).

Several outbreaks of *E.coli O_{157}* have been epidemiologically attributed to consumption of contaminated fresh and dry sausage and other meat products (Chinen *et al.,* 2001). Other foodstuffs including unpasteurized milk and dairy products manufactured from raw milk, however, have been implicated in many outbreaks, (Maher *et al.,* 2001).

Foodborne Salmonellosis continues to be a significant public health problem. Various meat products have been associated with outbreaks caused by *Salmonella, Shigella and E.coli O_{157}* (CDC, 2002). During slaughter, pathogenic bacteria may contaminate the carcasses and subsequently be distributed via cut meat or meat materials intended for further processing into meat products (Borch and Arinder, 2002).In addition, human Salmonellosis has been recognized due to consumption of raw or improperly pasteurized milk and milk products (McEwen *et al.,* 1988). Although the heating kills the pathogens, the heated food may become recontaminated by food handlers or from cross contamination with vegetables salad during processing, marketing and in food service operations.

Therefore, this study was carried out to determine the prevalence of *E.coli O_{157} and Salmonella* in raw milk, kareish cheese, fresh sausage and hawawshy collected from farmer's houses, butcher's shops and retail markets in Beni-Suef Governorate as well as discussing the public health significance of the isolated microorganisms and suggestive control and preventive measures.

Materials and methods

Collection of samples. A total of 200 raw food samples including cow's milk, kareish cheese, fresh sausage and hawawshy (spiced minced meat) (50 samples of each) were randomly collected from farmer's houses, butcher's shops and retail markets in Beni-Suef governorate. All samples were identified and rapidly delivered to the laboratory in an insulated ice-box to be examined for presence of such pathogens.

Experimental techniques.

Table (1): Incidence of *E.coli O_{157}* in examined food samples

Samples	No. of samples	Positive samples	
		No.	%
Raw milk	50	0	0
Kareish cheese	50	1	2
Sausage	50	1	2
Hawawshy	50	0	0
Total	200	2	1

Table (2): Incidence of *Salmonella* in examined food samples

Samples	No. of samples	Positive samples		Serotype
		No.	%	
Raw milk	50	0	0	0
Kareish cheese	50	2	4	S.menden & S.allerton
Sausage	50	2	4	S.III arizonae (2 strains)
Hawawshy	50	1	2	S.anatum
Total	200	5	2.5	

Isolation of *Escherichia Coli O_{157}* (De-Boer and Heuvelink, 2000). Twenty five grams of each hard sample were separately homogenized with 225 ml of modified Tryptone soy broth supplemented by novobiocin (20 mg/ l) for 2 min. using sterile homogenizer(Universal Laboratory, Poland). Milk sample (25ml) was directly added to modified Tryptone soy broth supplemented by novobiocin. The inoculated broth was incubated at 37 ˚C for 24 h. A loopful from the incubated broth was streaked onto Telluritte- Cefixime Sorbitol Mac Conkey agar plate and incubated at 37 ˚C for 24h. Sorbitol negative colonies (colourless) were picked up and purified then examined biochemically and serologically.

Isolation of Salmonella. The applied technique was recommended by (Flowers *et al.,* 1992) as follows: Twenty five grams of each hard sample were homogenized in 225 ml of buffered peptone water (BPW), under aseptic conditions for 2 min. by using sterile homogenizer, while 25 ml of milk sample were thoroughly mixed with 225 ml of BPW. All samples were incubated at 35 ˚C for 24 $\pm$ 2 h. One hundred microliters from the pre-enriched sample was transferred to 10 ml of Rappaport Vassiliadis (RV) enrichment broth and incubated at 43 ˚C for 24h. Loopfuls from enriched RV broth were separately streaked onto each of xylose lysine desoxycholate (XLD) agar and Salmonella-Shigella (SS) agar plates and incubated at 37 ˚C for 24h. Two or three of typical or suspected colonies (colourless with black center on SS and red colonies with black center on XLD) were selected from each selective medium and streaked onto nutrient agar slope which incubated at 37 ˚C for 24h., for further biochemical and serological identification.

Serological identification of *E.coli O_{157} and Salmonella.* Serological identification of the strains was carried out in the Clinical Microbiology Department, Central Health Laboratories of Ministry of Health and Population, Egypt.

Results and Discussion

Because the reservoir of *E.coli* is the intestinal tract of both man and animals, the presence of such organism in foods and water is used as indicator of feacal pollution either directly or indirectly (ICMSF 1978).

According to the data summarized in Table (1), *E.coli O_{157}* was detected in one sample (2%) of each kareish cheese and sausage samples. However, it could not be detected in raw milk and hawawshy samples.

Similar results of cheese samples were reported by Aksu *et al.,* 1999; Moustafa 2004, while Abd El-Hady, *et al.,* 1995; Gonul, 1997; El-Kosi, 2001, reported higher values. On the other hand Ansay and Kaspar (1997); Aman, *et al.,* (1998); Svoboda, *et al.,*(1998) ; Ibrahim and Sobeih, (2006) failed to isolate *E.coli O_{157}* from cheese samples.

The presence of *E.coli O_{157}* in kareish cheese could be attributed to the fact that it is usually made from raw skim milk, in addition to the primitive way of processing, handling and selling.

The lack of isolation of *E.coli* O_{157} from raw milk is not surprising, since also Hancock *et al.,* (1994); Ansay and Kaspar, (1997); Aman *et al.,* (1998); Heuvelink *et al.,* (1998); Coia *et al.,* (2001) did not find *E.coli* O_{157} in raw milk. On contrary, Padhye and Doyle (1991); Abd El-Hady *et al.,* (1995); Abdul-Raouf *et al.,* (1996); Abd El-Khalek, *et al.,* (2001); Sayed and Hussein (2003); Reuben, *et al.,* (2003); Amer and Soliman (2004); Hammad (2004); Moustafa, (2004); Picoozzi, *et al.,* (2005) could isolate the *E.coli* O_{157} from milk at various percentages.

The failure in detection of *E.coli* O_{157} in milk and hawawshy is mainly returned to isolation of *E.coli* O_{157} is often difficult as it is present sporadically at very low levels among very high levels of competitor organisms (Siriken, *et al.,* 2006).

Nearly similar results of *E.coli* O_{157} in sausage were reported by (Magwira, *et al.,* 2005). High figures were reported by (Chapman *et al.,* 2000; Chinen *et al.,* 2001). Low figures were reported by (Vernozy-Rozand, *et al.,* 1997; Dontorou *et al.,* 2003). On the other hand (Saleh, 2001; Kassem and Sabry 2003; Abd El-Rahman 2006; Soliman and El-Tabiy 2006) failed to isolate *E.coli* O_{157} from sausage samples .

The presence of *E.coli* O_{157} in sausage could be attributed to the contamination from faeces of infected animals as well as reflect the unsatisfactory hygienic measures during manufacturing and handling. This held the view reported by Suthienkul, *et al.,* (1990); Soliman and El-Tabiy (2006).

E.coli O_{157} is considered to be a typical food borne pathogen and responsible for several outbreaks. The majority of outbreaks have been commonly associated with the consumption of a variety of raw foods of animal origin such as undercooked ground beef, fresh and dry sausage, raw milk and milk products, vegetables salad and untreated water (Martin *et al.,* 1986; Tuttle and Gomez 1990; Griffin and Tauxe 1991; Chinen *et al.,* 2001; Licene *et al.,* 2001).Manifestation of illness caused by *E.coli* O_{157} include non bloody diarrhea, hemorrhagic colitis, cystitis hemolytic uremic syndrome and thrombotic thrombocytopenic purpura due to production of shiga like toxin (verocytotoxin) (Wells *et al.,* 1991 ; Abdul-Raouf *et al.,* 1993).

It is evident from table (2) that the incidence of isolated *Salmonella* organism from kareish cheese , sausage and hawawshy samples were 2 (4%), 2 (4%) and 1 (2%), respectively.

Many studies have been conducted to determine the prevalence of *Salmonella* in fresh sausage. Similar result was recorded by Sadek, (1963). High prevalence were recorded by Weissman, and Carpenter,(1969); Abd El-Aziz, (1979); Tolba, (1986); Abd El-Aziz, (1987); Ahmed, (1988); Khalafalla, (1988); El-Mossalami, *et al.,* (1989); Fathi, *et al.,* (1994); Helmy, *et al.,* (1995); Abrahim, *et al.,* (1998); Escartin, *et al.,* (1999) and Soliman, *et al.,* (2002). Low incidence was reported by Fathi and Thabet, (2001).On the other hand Lotfi, *et al.,* (1988); Mousa, *et al.,* (1993) ; Abd El-Atty (2005) failed to isolate *Salmonella* from sausage samples.

The presence of *Salmonella* in sausage may be attributed to the fact that this product is made from raw meat in addition to natural casing is often used in the manufacture which may be important source of *Salmonella* especially if proper hygienic measures is neglected (Escartin *et al.,* 1999).

No *Salmonella* could be detected in the examined milk samples (table, 2). These result was in acceptance to the findings reported by Richter, *et al.,* (2000); Eleftheriadou, *et al.,* (2002), while McEwen, *et al.,* (1988); Saudi and Moawad (1990); Jayarao and Henning, (2001); Abd El-All, *et al.,* (2005) could isolate *Salmonella* from raw milk with different values..

There is no much available data about the prevalence of Salmonella in kareish cheese, however, El-Kosi, (2001) reported low (3.33%) incidence of *Salmonella* in kareish cheese. On the other hand El-Bassiony (1977); El-Kholy (1989); Bahout and Moustafa (2006) failed to recover *Salmonella* from kareish cheese samples.

Kareish cheese is a popular Egyptian food due to its high nutritive value and cheap price, manufactured from raw skim milk and consumed fresh giving rise to concern that this product may be a threat to consumer health and safety as a result of presence of some pathogenic microorganisms especially *Salmonella* due to using raw milk in the production accompanied by improper sanitary practices during manufacturing, handling and selling.

This study detected that the prevalence of *Salmonella* in hawawshy was 2 % in contrast to those reported by El-Mossalami, (2006), who has reported that the hawawshy was free from *Salmonella*.

Concerning *Salmonella* serotypes, *S.menden and S.allerton* were isolated from two kareish cheese samples, while *S.III arizonae* (2 strains)

were isolated from sausage samples, but *S.anatum* was detected in hawawshy samples. It is generally accepted that the presence of any serotype of *Salmonellae* in a food should be regarded as a potential hazard for man (Fathi *et al.,* 1994).

In recent years, several outbreaks of Salmonellosis in humans have been recorded due to consumption of raw or improperly pasteurized milk or milk products, meat and meat products (McEwen *et al.,* 1988; Escartin *et al.,* 1999).

From the present data it can be concluded that the kareish cheese, sausage and hawawshy represents a potential hazard for consumers, due to the potential presence of *E.coli O157 and Salmonella* as well as there is neglected sanitary measures adopted during manufacturing, handling and distribution of such fresh foods. Consequently, food manufacturers and specialists should design comprehensive programs as good manufacturing practices (GMP) and implementation of HACCP system to ensure the freedom of such foods from these pathogens. In addition, effective heat treatment for foods, provision of information to food handlers and consumers as well as application of strict hygienic measures during manufacturing, storage and selling of these products to improve its quality and safeguard the consumers against infections of such organisms. Due to limitation of data about the occurrence of *E.coli O157 and Salmonella* in kareish cheese and hawawshy, further studies should be directed in this kind of foods.

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مدى تواجد ميكروب السالمونيلا والإيشيريشيا كولاى O_{157} فى بعض الاغذبة

اجريت هذه الدراسة على ٢٠٠ عينة من الاغذية الخام لتقرير ما بها من السالمونيلا والإيشيريشيا كولاى O_{157} . شملت الدراسة فحص كلا من اللبن الخام والجبن القريش والسجق الطازج والحواوشى بواقع ٥٠ عينة من كل منتج. امكن عزل ميكروب الإيشيريشيا كولاى O_{157} من عينة واحدة من كلا من الجبن القريش والسجق الطازج بنسبة ٢ % لكل منهما بينما لم يتم عزلها من اللبن الخام والحواوشى .اما ميكروب السالمونيلا فقد تم عزله من عينتين من الجبن القريش و وعينتين من السجق الطازج و عينة حواوشى بنسبة ٤ % ، ٤ % و ٢ % على التوالى بينما لم يتم عزله من اللبن الخام. تم عزل عترتى السالمونيلا مندن والسالمونيلا ألرتون من عينتى الجبن القريش وعترة السالمونيلا III أريزونا من عينتى السجق وعترة السالمونيلا أنيتم من عينة الحواوشى. هذا وقد نوقشت الاهمية الصحية والاقتصادية للنتائج واقترح مايجب اتباعة من اجراءات لضمان حماية صحة المستهلك.