

## ***E. coli* Assessments of “Kasar Cheese” via Compact Dry Method at Primary School Canteens in Ankara, Turkey**

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The aim of the study was to determine food processing hygiene quality of Kasar (a mild, pale yellow cheese made of sheep's milk) cheese primary school canteens. Detection of *Escherichia coli* with Compact Dry method in raw Kasar cheese in Ankara, Turkey. Compact Dry *E. coli* coliform count (EC) is a ready-to-use test method for the enumeration of *Escherichia coli* and coliform bacteria in food. Two pieces (min 50 gr) of kasar cheese samples were handled as food handlers at same conditions at school canteens. Twenty five gram of minced samples were diluted and homogenized with 125 ml of sterilized distilled water. After waiting for 30 minutes 1mL diluted sample inoculated onto center of the self-diffusible medium. Twenty eight percent of kasar cheese was graded as unacceptable and potential hazardous because of presence of numbers of *E. coli* colonies. According to this study it was shown that Compact Dry method is a rapid and safe technique for determining *E. coli* at food stuff. As a result of this study show that presence of pathogenic microorganisms in raw kasar cheese can be related to processing conditions (to make sandwich or toast) at school canteens and occurrence of food borne illnesses at primary schools.

**Key words:** School Canteen, Food Poisoning, Compact Dry Method, Kasar cheese.

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Food borne disease, serious public health problem around the world. More than 76 million foodborne illness, including 325,000 hospitalizations and 5,000 deaths, occur in the United States each year. According to the United

States Department of Agriculture (USDA), foodborne illness costs the US economy \$10–83 billion per year<sup>1</sup>.

*Escherichia coli* O157 H7 remains a public health problem especially associated with hemolytic uremic syndrome (HUS) and it also verocytotoxin-producing or shiga-toxin-producing organism<sup>2-4</sup>. The first outbreaks occurred in USA in 1982, individuals who have severe abdominal cramps and diarrhea after consuming hamburgers in a restaurant<sup>4</sup>. The main source of *E. coli* O157 H7 is ruminants and it is not pathogenic organism for this kind of animals. Numbers of

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microbiological studies show that (UK, Ireland, Denmark etc.) the source of transmission of *E.coli* was food in 42.2 %, dairy products in 12.2%, animal contact in 7.8%, water in 6.7%, environmental in 2.2% and unknown 28.9%. Dairy foods as cheese, milk, butter, yogurt and some foods as hamburgers, poultry, ready to eat cold meats and other fermented meat products can be vector for this organism<sup>5</sup>. The data from Turkey shows that 21.4% ka<sup>o</sup>ar cheese collected from Istanbul contaminated with *E.coli* (6). Several outbreaks involving pathogenic *E.coli* have been caused by the consumption of contaminated cheese<sup>7</sup>. In many parts of Europe and South America, it was detected that the incidences of microbial food poisoning caused by *E.coli* which produces verocytotoxin increased significantly<sup>8</sup>.

An adequate diet and eating safe food is very important especially for risk groups as like as school age children. It promotes growth, development and health<sup>9,10</sup>. In primary schools, students meet their nutritional needs with food-drinks that they mostly buy from school canteens or bring from their homes. School canteens sell some foods like as bisques, toasts with kasar cheese and sucuk (fermented traditional meat) and also some beverages<sup>11</sup>. Schools give service to children, who are classified as risk group<sup>12</sup>. Because the immunity system of children is weaker than adults and their risk of food poisoning is higher<sup>11</sup>.

Like in all food service institutions, in school canteens, purchasing, storing, preparing, cooking and serving of foods must be made in accordance with some rules. The products in school canteens should not only be suitable for school age children, but also they should be eligible to consume in terms of hygiene. According to notice published by the Ministry of Education in 1998, titled as "The Control of School Canteens", it was stated that contagious diseases are mainly originated of non hygienic foods and beverages. It was also emphasized that students should be educated to prevent contagious diseases and school canteens should be run according to the hygiene rules<sup>13</sup>. Another rule published in 2006 titled as "Hygiene Rules in Canteens", general information like personal hygiene and education level of staff and physical conditions of canteens was stated<sup>14</sup>.

## MATERIAL AND METHODS

This study was carried out in 25 canteens which represents the primary schools of the Çankaya District of Ankara. In this study, samples of 50 g kasar cheese which was given by employees of canteens, was brought to Food Microbiology Laboratory of Nutrition and Dietetics Department of Hacettepe University. Twenty five gram of sample taken and homogenized for 10 minutes with 125 ml sterile distillate water in stomacher (IUL, Germany). One ml liquid, passed through filter, was inoculated in the middle of the ready to use agar (Compact Dry), according to the user manual. Agars were left for incubation for 24 hours at 35°C, as stated by the producer. The blue colonies counted in agar shows presence of *E.coli*. Samples were classified as acceptable and unacceptable by *E.coli* presence in reference of Turkish Food Codex microbiological criteria statement.

## RESULTS AND DISCUSSION

In the study, *E. coli* was determined in 28% of ka<sup>o</sup>ar cheeses which were collected from school canteens and this situation was classified as unacceptable according to "Notification of Milk and Milk Products". Similarly, Oktay et al determined that 21.4% ka<sup>o</sup>ar cheese contaminated with *E.coli* in their study<sup>6</sup>. Another article held in Elazığ/Turkey show that 8% of packaged ka<sup>o</sup>ar cheese contaminated by *E.coli*<sup>15</sup>. A study designed by Mehmetođlu<sup>7</sup> et al. to determine of presence of two environmental pathogens in two dairy factories show that *E.coli* was isolated from the swap samples taken from the workers hands, gloves as well as drain and floor. Therefore one raw milk sample also contained *E.coli*. In contrast some researcher cannot isolate *E.coli* form ka<sup>o</sup>ar cheese or cheddar cheese wich is similar production style with ka<sup>o</sup>ar cheese<sup>7,16</sup>.

**Table 1.** Situations of *E.coli* in Kasar Cheese with Compact Dry Method

Compact Dry <i>E.coli</i>	Sample of Kasar cheese	
	n (Blue Colonies)	<i>E.coli</i> %
<i>E.coli</i> +	7	28
<i>E.coli</i> -	18	72
Total	25	100

Foods, which was prepared without obeying personal hygiene rules, should be contaminated by cross contamination way. At the same time, good manufacturing rules in producing animal origin foods and suitable heat treatment before consuming have a place in controlling and preventing infections of *E.coli* O157:H7<sup>17</sup>. Toasts which are made with not enough heat treatment in school canteens and include ka<sup>o</sup>ar cheese are another reason of *E.coli* existence<sup>11</sup>. In addition to this source pathogens can be food preparation surfaces, cutting boards and knives from, they can cause cross contamination. Inappropriate food preparation techniques are also one of the factors of food borne diseases. Methods for eliminating pathogens in food-contact surfaces and other equipments are extremely important for defining critical control points in canteens, restaurants and other food service places<sup>11, 18</sup>.

### CONCLUSION

After the research, *E.coli* was detected in ka<sup>o</sup>ar cheese which is used for making toasts for children in primary school canteens, and this threatens children's health. *E.coli* is the bacteria that should not be in ka<sup>o</sup>ar cheese according to Turkish Food Codex. It is necessary to control the primary school canteens closely in terms of aspects mainly hygiene and these controls must be included in legal arrangements.

For preventing food borne illnesses in our country, people, who work in food services, should be well educated on hygiene especially. This education should be given by dieticians regularly. It has been concluded that the production of this type of cheese and toasts should be based on HACCP/ISO22000 and other food safety measures and inspections of the final product at retail points should be made more frequently to protect consumer health.

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### REFERENCES

1. Nyachuba DG. Foodborne illness: is it on the rise? *Nutr Rev* 2010; **68**: 257-69.
2. Locking ME, Pollock KG, Allison LJ, Rae L, Hanson MF, Cowden JM. Escherichia coli O157 Infection and Secondary Spread, Scotland, 1999-2008. *Emerg Infect Dis* 2011; **17**: 524-7.
3. Tarr PI, Gordon CA, Chandler WL. Shiga-toxin-producing Escherichia coli and haemolytic uraemic syndrome. *Lancet* 2005; **365**: 1073-86.
4. Pennington H. Escherichia coli O157. *Lancet* 2010; **376**: 1428-35.
5. Rangel JM, Sparling PH, Crowe C, Griffin PM, Swerdlow DL. Epidemiology of *Escherichia coli* O157:H7 outbreaks, United States, 1982-2002. *Emerg Infect Dis* 2005; **11**: 603-9.
6. Oktay I, Heperkan D, Kaya G, Peynir, Tereyagi ve Kumpirde Patojen Mikroorganizmalar ve Hizli Test Yöntemi VIDAS ile Listeria ve Salmonella Aranmasi. Türkiye 9. Gıda Kongresi. Bolu/Türkiye, 2006.
7. Cagri-Mehmetoglu A, Yaldirak G, Bodur T, Simsek M, Bozkir H, Eren NM. Incidence of *Listeria monocytogenes* and *Escherichia coli* O157:H7 in two Kasar Cheese processing environments. *Food Control* 2011; **22**: 762-766.
8. Miles S, Braxton DS, Frewer LJ. Public perceptions about microbiological hazardous in food. *British Food Journal* 1999; **101**: 744-762.
9. Akman M, Akan H, Izbirak G, ve ark. Eating patterns of Turkish adolescents: a cross-sectional survey. *Nutr J* 2010; **9**: 67.
10. H. Seppa, L. Abrahamssona, M. Lennerna Junbergerb, Risvika E. The contribution of food groups to the nutrient intake and food pattern among pre-school children. *Food Quality and Preference* 2002; **13**:107-116.
11. Uyar M.F., *Ankara'nin Çankaya İlçesindeki İlköğretim Okullarındaki Kantinlerin Hizmet Kalitesi Karşılabilen Sorunlar ve Çözüm Önerileri*. Yüksek Lisans, Hacettepe Üniversitesi, Ankara 2006.
12. Finch M, Sutherland R, Harrison M, C. C. Canteen purchasing practices of year 1-6 primary school children and association with SES and weight status. *Aust NZ J Public Health* 2006; **30**: 247-51.
13. Annon. Okul Kantinleri Denetimi Genelge Tarih: 16/09/1988. 1988.
14. Birinci N. Kantinlerde uygulanacak hijyen

- kurallari. Bakanliđi MEBSID, ed., 2006.
15. Öksüztepe G., Patir B., Dikici A., Ilhak I. Elazigda Tüketime Sunulan Vakum Paketli Taze Kaşar Peynirlerinin Mikrobiyolojik ve Kimyasal Kalitesi. *F.Ü. Sag.Bil.Vet.Derg.* 2009; **23**: 89-94.
  16. Ansay SE, Kaspar CW. Survey of retail cheeses, dairy processing environments and raw milk for *Escherichia coli* O157:H7. *Lett Appl Microbiol* 1997; **25**: 131-4.
  17. Faith NG, Wierzba RK, Ihnot AM, ve ark. Survival of *Escherichia coli* O157:H7 in full- and reduced-fat pepperoni after manufacture of sticks, storage of slices at 4°C or 21°C under air and vacuum, and baking of slices on frozen pizza at 135, 191 and 246°C. *J Food Prot* 1998; **61**: 383-9.
  18. Bas M. Besin Hijyeni Güvenliđi ve HACCP. Ankara: Sim Matbaacilik Ltd.Sti, 2004.
  19. Uyar *et al.*: The Determination of *S. aureus* and *S.aureus* Enterotoxin - A Producing Strain by Real-Time PCR at Meatball Meals of Two Hospitals in Ankara, Turkey, *J. Pure & Appl. Microbiol.*, **5**(1), 2011.