A Research Note

Incidence of Listeria spp. in Retail Foods in the United Arab Emirates

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Abstract

A survey of 1,101 samples of retail food items in the United Arab Emirates (UAE) covering dairy products, fresh vegetables, fresh/frozen meat and poultry and a range of "ready-to-eat" meals indicated that the incidence of Listeria monocytogenes was, in general, extremely low. Only in imported frozen chicken was L. monocytogenes detectable with a high degree of frequency, but fresh chicken and semi-processed meats of local origin were also contaminated. No indication of the number of organisms present in any given sample was sought, but as all the suspect foods would have been cooked prior to consumption, risks to the consumer should have been minimal. Listeria was not found in any "ready-to-eat" meals, including those made from chicken. Although Listeria innocua and Listeria welshimeri were detected in some retail foods, these species are normally regarded as being of little consequence with respect to public health.

Key Words: Listeria, methods, survey, retail foods.

Equally important is the fact the Listeria are ubiquitous in nature, and L. monocytogenes in particular has, in addition to the foods cited above, been found in raw milk (11), ice cream, salad vegetables (12, 18), several varieties of cheese as well as oven-ready poultry (7, 10). This widespread occurrence of L. monocytogenes suggests that the poor storage of susceptible foods and/or cross contamination could lead to high colony counts being present at the time of consumption, and it was for this reason that the precautionary survey described in this paper was conducted.

Thus, while the UAE enjoy an excellent record with respect to food hygiene and no incidents of listeriosis have been documented, the volume of food imports from around the world is growing all the time, as is the range of locally-made products. Consequently, it was decided to examine a wide range of imported and local foods in order to establish:

(a) some indication of the incidence of Listeria spp. on retail items; and
(b) assess whether the level of contamination might pose any risk to consumers.

Materials and Methods

Collection of samples.

During the actual survey, retail samples were taken of pasteurized milk (fresh and reconstituted), several varieties of local and imported cheeses, fresh vegetables: including sweet potatoes, bean sprouts, cabbages and tomatoes, raw meat, poultry and fish, frozen chickens and semi-processed meats, (e.g., meat balls and burgers), as well as a number of locally-prepared, "ready-to-eat" meals of Arabic or Western origin. The samples were collected at regular intervals over a period of 6 months and, after transfer to sterile bags, were returned to the laboratory in insulated containers; any foods not examined immediately were stored at <4°C for a maximum of 24 h.

Composite samples of the above foods were prepared by blending equal portions from three/five retail units either in a sterile container (liquid milk) or using a Colworth Stomacher. A test aliquot of 25 g was then removed and added aseptically to 225 ml of the appropriate enrichment broth (see below). In the case of
chickens, the composite sample was obtained by removing skin from the back, neck, breast, wings and thigh of the five retail units and macerating to an homogenous mass.

Isolation and identification of Listeria spp.

The most widely used approaches to the isolation and identification of Listeria spp. are those based upon the Food and Drug Administration (FDA) method for dairy products (11) and the U.S. Department of Agriculture (USDA) method for meat and meat products (13). The International Dairy Federation (IDF) (8) has also published a method for dairy products, and all these procedures include enrichment followed by isolation onto selective agar, confirmation of suspect colonies to generic level and, finally, identification of species by various biochemical tests.

In the present study, it was decided to employ the University of Vermont Medium (UVM 1) - Fraser Broth method for all routine examinations involving meat, poultry, fish and "ready-to-eat" meals (Table 1), and Listeria Enrichment Broth (LEB) for examining all dairy products, as well as vegetables.

The composite samples (25 g) were added to the broths (225 ml) and, following enrichment (48 h at 35°C in LEB, or 24 h at 35°C in UVM 1 and Fraser Broth, respectively), loopfuls from either LEB or Fraser Broth were streaked onto the surface of Listeria Selective Medium (LSM - Oxford Formulation). The slightly elevated temperature of incubation for the enrichment broths (35°C as against 30°C recommended by the IDF [8]) was selected to comply with the advice relating to Fraser Broth (1), even though the lower temperature might have been more appropriate to resuscitate any cells that had been subject to stress (15).

The plates were examined after 48 h at 35°C for colonies producing black zones of aesculin hydrolysis. Colonies giving a "positive" reaction were then inoculated into Brain Heart Infusion broth for a motility test after 24 h at room temperature, and also streaked onto Tryptone Soya Yeast Extract Agar (TSYE A) to provide colonies for gram staining and the catalase and oxidase tests. Colonies from LSM that consisted of catalase-positive, oxidase-negative, gram-positive, short bacilli with tumbling motility were further examined for Beta-haemolysis and the CAMP reactions. Final identification as to species was carried out employing the Analytab Products (API) Listeria System (2).

RESULTS AND DISCUSSION

A total of 431 samples of dairy products were examined (Table 1), and all the samples of pasteurized milk were negative for Listeria spp. In contrast, four samples of imported white-brined cheese were found to be positive, and two of the isolates were confirmed as L. monocytogenes; the remaining two isolates were found to be L. innocua. The ability of Listeria to survive in brined cheeses has been reported elsewhere (16), and hence a low level of incidence (2.0% in the present survey) is not unexpected. It is of note also that, while two of the positive samples were available as "loose" cheese, the others were taken directly from cans sealed by the manufacturers; whether this latter observation indicates that raw milk was used in production or post-pasteurization contamination is not clear. However, the overall incidence was favorable in comparison with reports from elsewhere (4), where rates of contamination for Western-style cheeses were up to 7%. Hence while cheese remains a possible vehicle for Listeria, the risk to consumers in the UAE would appear to be below average. The situation with fresh vegetables was encouraging in that no isolates of L. monocytogenes were found in any of the 183 samples tested, and only four positives for L. innocua were recorded. This apparent absence of L. monocytogenes confirms the view that fresh vegetables are unlikely to be a source of listeriosis (12). Obviously, the use of contaminated manure on fields can change the position dramatically (17), as can the chopping and mixing associated with the production of pre-packed salads. However, the actual level of contamination in pre-packed vegetables should still be too low to cause real concern, and it has been suggested that <100 CFU/g of L. monocytogenes in mixed salad vegetables would be an acceptable standard (12).

Out of 70 samples of raw meat examined (Table 1), seven were positive for L. innocua, and the same organism was isolated twice from samples of fresh fish. Fresh chicken was found to be more prone to contamination, and ten out of 30 samples tested positive; L. monocytogenes and L. welshimeri were each isolated from one sample, and the remaining eight "positives" were L. innocua.
The examination of imported frozen chicken found that 32 out of 39 samples were contaminated with Listeria, with 18 of the 32 "positives" being confirmed as L. monocytogenes. This latter organism was also isolated from 12 out of 107 samples of frozen semi-processed meat products, while L. welshimeri was found in two samples and L. innocua in a further 20. Whether or not the high level of contamination of frozen chicken (82%) as against 33% for fresh product is a reflection of the contrasted sources of supply or differences in processing was not established, but clearly poultry can act as a significant carrier of L. monocytogenes. However, the fact that these retail items will be cooked before eating should eliminate any direct risk to consumers, for only extensive cross-contamination of other foods could lead to cell counts capable of causing disease.

The absence of contamination in any of the 197 "ready-to-eat" meals suggests that, as long as sound methods of food handling are employed in the home, "prepared foods" need not pose any risk for the consumer – at least as far as Listeria spp. are concerned.

A point emphasized, perhaps, by the fact that the meals included dishes based on chicken and semi-processed meats, as well as prepared salads. In other words, the range included foods where the raw materials might, on the basis of the survey, have been anticipated to be reservoirs of Listeria, as well as foods which, under conditions of poor hygiene, could have been subject to cross-contamination, and yet the microbiological quality of the sampled products was excellent.

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REFERENCES


