Enterotoxigenic *Escherichia coli* (ETEC) Isolated in the Tel-Aviv (Israel) Area

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Abstract. The prevalence of enterotoxigenic *E. coli* (ETEC) as a pathogenic agent of diarrhoea in the Tel-Aviv (Israel) area was determined, and the isolated *E. coli* strains characterized. During three periods (summer 1977, summer 1978, and summer 1979), a total of 335 specimens were tested for the presence of *E. coli* producing LT and ST toxin. Most of the specimens were from sporadic ambulatory diarrhoea cases (children and adults) attending a number of health care clinics in Tel-Aviv. Two to five colonies were tested from each sample. ETEC was detected in 69 cases (20%): LT/ST strains were isolated from 9 cases (2.7%); LT from 7 cases (2.1%); and ST from 53 cases (15.2%). ETEC was isolated in all age groups.

In 19 specimens, 2 or more of 4 colonies tested were enterotoxigenic and were identical according to biotype, antibiotic sensitivity, and serogroup. These findings suggest that enterotoxigenic strains predominated in the bacterial population of the stool specimen. Part of the isolated ETEC strains belonged to serotypes already known as enterotoxigenic in different geographic areas of the world. The most frequently encountered were serogroups O8 (9 cases) represented by at least three serotypes, among them O8:K40:H9, and serotype O6:K15:H16 (5 cases); a number of serotypes were represented only by two cases or by single cases. Among 16 LT-producing stains (LT/ST and LT-only), 13 belonged to 3 serogroups, while ST-only strains represented a large spectrum of serotypes, some of which are now known as enterotoxigenic. Several serotypes common in other geographical locations were not detected.

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Introduction

During recent years enterotoxigenic *E. coli* strains have been recognized as the aetiological agents in diarrhoea in children and adults. These strains, termed ETEC, can produce both LT (heat labile) and ST (heat stable) enterotoxins, or one of these [11, 12, 17, 20, 24]. The disease can appear in outbreaks as well as in sporadic cases. Its morbidity and character vary according to geographic area, climatic, and socio-economic factors, and is much more common in developing countries and in hot climates [1, 2, 18, 19, 23, 24, 27].

Following the isolation of a large number of enterotoxigenic *E. coli* strains all over the world, investigators tried to find the correlation between enterotoxin production and serogroups, serotypes, and biotypes [15, 16]. Merson et al. [14] found that 86% of 60 LT/ST-producing strains isolated in Bangladesh belonged to one of four serogroups; the most common were serogroup O8 (serotype O8:K40:H19), serogroup O78 (serotype O78:K::H12), and serogroup O6 (serotype O6:K15::H16). These serogroups or serotypes have also frequently been found in other countries [6, 17, 18].

According to reports from specific geographic areas, the LT-producing strains represent a limited number of serogroups or even particular bioserotypes [14, 17, 20, 25], while those strains that produce ST alone represent a larger spectrum of serogroups. Data on the distribution of ETEC among the local population in Mediterranean countries are scanty [2, 5]. In Israel diarrhoeal diseases are highly prevalent in the general local population. According to Yekutieli [28], in the period 1974–79 the annual incidence (per 10000) of bacterial dysentery was 16.4 and of food poisoning 12.6, the highest incidence among 13 selected infectious diseases in Israel. The prevalence of ETEC as an aetiologic agent of diarrhoea has not been tested in this country and is thus the reason for the present investigation. Results on the LT-producing strains have been published [29, 30].

Materials and Methods

The *E. coli* strains were isolated from stool specimens in the Zamenhof Central Laboratory of the Labour Sick Fund, Tel-Aviv, Israel. They were taken from out-patients of different age groups suffering from diarrhoea and processed for detection of Salmonella and Shigella. Those from children up to two years old were also processed for detection of EPEC. In both processes standard methods were used [7]. In addition to the specimens collected during summer 1979 from ambulatory patients in the Tel-Aviv area, specimens were also taken from 27 cases in a small town near Nazareth and from 11 cases of infants with diarrhoea in a Tel-Aviv hospital.

For detection of ETEC, an average of four lactose-positive colonies, morphologically typical for *E. coli*, were isolated from each of the MacConkey plates. The isolates were subcultured into deep Nutrient Agar (Difco, Detroit, USA) tubes and maintained at room temperature until they were tested for toxin production and other characteristics.

Enterotoxin-producing strains used as positive controls were kindly provided by Dr. C. Gyles (*E. coli* H339), Dr. D. J. Evans (*E. coli* H10407), and Dr. Z. Dafni (*E. coli* H408-3).