YERSINIA ENTEROCOLITICA GASTROENTERITIS IN EGYPTIAN INFANTS AND CHILDREN

ALIA SADEK; M. FARID and ZEINAB M. TAWFIK

From Departments of Clinical Pathology and Paediatrics, Faculty of Medicine, Ain Shams University.

ABSTRACT

This work was carried out on 75 infants and children complaining of diarrhea, vomiting, fever and/or abdominal pain. Their ages ranged between 6 months and 6 years. Twenty-five children of the same age and sex were studied as controls.

Patients and controls were subjected to careful medical history, clinical examination, stool culture for Yersinia enterocolitica (Y.E.) and indirect haemagglutination (I.H.A.) test to detect Y.E. antibodies in their sera.

The results of this study showed relatively low incidence of Y.E. infection among the patients and negative results in the controls. Stool culture showed only one positive case out of 75 patients (1.33%) and negative results in all controls.

As regards I.H.A. test, a titre of 1:320 for Y.E. antibodies serotype 0:3 and 0:9, which is diagnostic, was found only in 3 cases out of 75 patients (4%).
INTRODUCTION

The genus Yersinia comprises gram-negative coccobacillary organisms and includes 3 species: Y. Pestis, Y. Pseudotuberculosis and Y. Enterocolitica (Winblad et al., 1966). Although the genus Yersinia comprises the above mentioned species, the term Yersiniosis refers to the infection with Y.E. and Yersinia Pseudotuberculosis (W.H.O., 1981).

The yersiniosis are distributed world wide, large numbers of confirmed cases have been reported in Europe, Canada, the United States and Japan (Weaver and Jordan, 1973). This infection has been also reported from Asia (W.H.O., 1981). The disease is thought to be transmitted by fec-oral route (Swaminathan et al., 1982).

In infants and young children, the predominant clinical presentation is diarrhea which vary in its severity from loose stools to fulminating enterocolitis with ulcerative lesions and bloody diarrhea (Cornelis et al., 1987). Fever, vomiting, leucocytosis and high C-reactive protein are frequent findings (Vesikari et al., 1985). In older children and young adults, the most common symptom is abdominal pain accompanied by fever, nausea and vomiting suggesting acute appendicitis (Leino et al., 1987).

Septicemia is unusual in children and is most often reported in children or adults compromised by aplastic anaemia, malnutrition, malignancy, liver diseases, haemochromatosis or immunosuppressive therapy (Cornelis et al., 1987).

The most reliable methods for establishing the diagnosis are bacteriological culture, serological tests and indirect immunofluorescence technique. However, isolation of the organism from feces can be problematic because of its slow growth, over growth of normal intestinal flora and the difficulties in differentiating Y.E. from other members of Enterobacteriaceae family. Agglutinating antibodies appear in the sera of infected patients within the first week after the onset of symptoms, reached maximal concentration in the second week and may persist for several months (Leino and Kalliomaki, 1974). Titre of 1:80 was assumed as a cut-off level for evidence of infection and titre over 1:160 is considered diagnostic for the disease.

The role of yersinia enterocolitica infection in gastroenteritis in tropical and subtropical areas has not been adequately evaluated (Carniel et al., 1986). So the aim of the present work is to study the frequency of Y.E. infection in gastroenteritis in Egyptian infants and children.
SUBJECTS AND METHODS

The subject of this work consists of 75 infants and children, their ages ranged between 6 months and 6 years, 42 males and 33 females. The frequent complaints were diarrhea, vomiting, fever and abdominal pain. Twenty five healthy infants and children of matched age and sex were studied as controls. All the patients and controls were selected from outpatient clinic of paediatric department, Ain Shams University Hospitals, Cairo, Egypt, over 6 months period from February to July 1989. The patients and controls were subjected to the following investigations:

1. Full clinical history and clinical examination to exclude any other underlying diseases.

2. Bacteriological studies of stools for Y.E. Stools were obtained from the patients and controls, placed in phosphate buffered saline pH 7.2 for enrichment of Y.E. and kept in the refrigerator for 3 weeks, then cultured on 2 plates containing CIN media (which contain cefsulodin, Irgasan, Novobiocin), a selective media for Y.E. (Margorie, 1988). One plate is kept at 37°C for 24 hours, the other plate at 25°C for 24 hours. The typical colonies of Y.E. will develop after the incubation period as a dark red "bulls eye" surrounded by transparent border which can be differentiated from other organisms by the biochemical test API 20E.

3. Serological test using indirect haemagglutination (IHA) test for detection of Y.E. antibodies (Bair et al., 1981) using microtitration technique. The cellognost yersiniosis kits supplied from Behring Institute, Germany (1988) were used. I.H.A. test depends on the fact that if specific antibodies are present in the tested sera, they cause cross linkage on the antigen sensitized erythrocytes, this results in the formation of a so-called agglutination carpet. If the antibodies are absent, the sensitized erythrocytes are deposited at the bottom of the V-shaped well of the microtitration plate in the form of sharply outlined button. The quantitative test was performed with sera that were positive in the qualitative screening test. A current or past infection with Y.E. serotypes 0:3 and 0:9 is indicated by a titre of 1:160 and more.
Brucella test was performed for the positive cases for Y.E. to exclude Brucellosis which may give cross-reaction with Y.E. (Hurvell, 1977).

RESULTS

The results of this study are presented in Tables 1-3.

Table (1): shows the clinical symptoms among the different age groups of patients. 40 (53.4%) out of 75 patients had diarrhea, 20 (26.7%) had diarrhea and vomiting, 13 (17.3%) had diarrhea, vomiting and fever and 2 (2.6%) complained of diarrhea and abdominal pain.

Table (2): shows the results of stool culture for Y.E. in patients and controls. 1 (1.33%) out of 75 patients was positive and all of the controls were negative for Y.E.

Table (3): shows the titres of Y.E. antibodies among the different age groups of patients and controls. 3 (4%) out of 75 patients were positive with a titre of 1:320.

The ages of positive cases were between 2-6 years and no patients in the age group less than 2 years had positive results. All of the controls were negative for Y.E. infection.
Table (1): The presenting symptoms among different age groups of patients.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>6 months-2 years</th>
<th>2 years-4 years</th>
<th>4 years - 6 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>18 (24%)</td>
<td>14 (18.7%)</td>
<td>8 (10.7%)</td>
<td>40 (53.4%)</td>
</tr>
<tr>
<td>Diarrhea and vomiting</td>
<td>8 (10.7%)</td>
<td>6 (8%)</td>
<td>6 (8%)</td>
<td>20 (26.7%)</td>
</tr>
<tr>
<td>Diarrhea, vomiting and fever</td>
<td>4 (5.3%)</td>
<td>4 (5.3%)</td>
<td>5 (6.7%)</td>
<td>13 (17.3%)</td>
</tr>
<tr>
<td>Diarrhea and Abd. Pain.</td>
<td>0 (0%)</td>
<td>1 (1.3%)</td>
<td>1 (1.3%)</td>
<td>2 (2.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>30 (40%)</td>
<td>25 (33.3%)</td>
<td>20 (26.7%)</td>
<td>75 (100%)</td>
</tr>
</tbody>
</table>
Table (2): Results of stool culture for Y.E. in patients and controls.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Total</th>
<th>Positive culture</th>
<th>Negative culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>75</td>
<td>1 (1.33%)</td>
<td>74 (98.67%)</td>
</tr>
<tr>
<td>Controls</td>
<td>25</td>
<td>0 (0%)</td>
<td>25 (100%)</td>
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Table (3): Yersinia enterocolitica antibody titres detected by I.H.A. test in patients and controls.

<table>
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<tr>
<th>Age group</th>
<th>No.</th>
<th>&lt;80</th>
<th>80</th>
<th>160</th>
<th>320</th>
<th>640</th>
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</thead>
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<tr>
<td>I. Patients:</td>
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<tr>
<td>6months-2years</td>
<td>30</td>
<td>(40%)</td>
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<td>-</td>
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<td>-</td>
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<tr>
<td>2years-4years</td>
<td>25</td>
<td>(33.3%)</td>
<td>23</td>
<td>(30.6%)</td>
<td>-</td>
<td>2 (2.7%)</td>
</tr>
<tr>
<td>4years-6years</td>
<td>20</td>
<td>(26.7%)</td>
<td>19</td>
<td>(25.4%)</td>
<td>-</td>
<td>1 (1.3%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>75</td>
<td>72</td>
<td>96%</td>
<td>3</td>
<td>4%</td>
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<td>II Controls:</td>
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<td>25</td>
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</table>
Indirect Haemagglutination test shows 3 positive cases of Yersinia Enterocolitica.
DISCUSSION

In this study, stool culture for *yersinia enterocolitica* was positive in 1 (1.33%) out of 75 patients and negative in all controls (0%).

A titre of 1:320 for Y.E. antibodies was detected in 3 (4%) out of 75 patients. The age of serologically positive cases were between 2-6 years. No patients in the age group less than 2 years had positive results.

The low incidence of Y.E. infection in this work may be due to hot weather in Egypt during the summer months which is unfavourable for Y.E. to grow and to exhibit its virulence. This is in agreement with Carniel et al., (1986) who isolated only one case of Y.E. from stools of 1450 children with fever and diarrhoea in Bangladesh. Later, Tolba et al., (1988) were able to find prevalence rate of 0.6% of Y.E. in stool of normal Egyptian children. On the other hand, cold enhancement of virulence may be a perquisite for pathogenicity, especially that the motility and toxin production occur at lower temperature (Swaminathan et al., 1982 and Attwood et al., 1987). In addition, the invasive power of Y.E. was reported to be more pronounced at 22° C than that at 37° C (Pedrson et al., 1979), which was proved later by Marks et al., (1980) who isolated 181 cases from the stools of 6364 children (2.8%) with gastroenteritis in Canada.

Another factor which may explain the low incidence of Y.E. infection in our patients is iron deficiency anaemia which is common in Egypt and contributes to the reduction of invasiveness of Y.E., while excess iron renders it more virulent like in patients with B-thalassaemia major which are more prone to *Yersinia* infection (Schwarnetz et al., 1984 and Khalifa et al., 1989).

In addition, animals like pigs which act as a reservoir for Y.E. infection in Europe (Carniel et al., 1986) are scarcer in our country.

In our studied groups, the ages of all patients with positive I.H.A. test were between 2 and 6 years because the antibody response for Y.E. may be age dependent, since children under one year are less likely to have a serologic response than older children (Marks et al., 1980).

In conclusion : Y.E. infection must be considered in the differen-
tial diagnosis of gastroenteritis, appendicitis and unexplained fever in Egyptian children.

REFERENCES


الملخص العربي

دراسة عن الالتهابات العوية السببة ببكتريوم البروسيليا في الأطفال العربين

د. علي بصدق - د. محمد فرید - د. زينب توفيق
من قسم الباثولوجيا الإكلينيكية والأطفال - كلية الطب جامعة عين شمس

أجري هذا البحث على 100 طفلا مصريا (50 طفلا مريضا بالالتهابات العوية و50 طفلا سليما كمجموعة ضابطة).

تم في هذا البحث فحص جميع الأطفال اكلينيكيا - عمل مزرعة بكتريولوجية خاصة ببكتريوم البروسيليا كأعمال مفصلة للاجسام المضادة لبكتريوم البروسيليا. وكذلك تم فحص اعمال جميع الأطفال للجسم المضادة لبكتريوم البروسيليا.

وقد أظهرت نتائج هذا البحث الالتباس النسبية ببكتريوم البروسيليا حيث كانت النتائج كالآتي:
- أظهرت نتائج مزرعة البراز أن هناك حالات واحده ايجابيه من بين الـ 75 مريضا بنسبة (12.3 %).
- أظهرت نتائج فحص الامعاس للجسم المضادة لبكتريوم البروسيليا أن هناك ثلاثة حالات مصابه من بين الـ 75 مريضا بنسبة (4 %).
- جميع النتائج كانت سلبية في المجموعة الضابطة.