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Co-infection of *Helicobacter pylori* and *Escherichia coli* in a 4-year-old child

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ABSTRACT

Helicobacter pylori (*H. pylori*) is a colonizer of more than half population worldwide among all age groups. *Escherichia coli* (*E. coli*) isolates are also colonizers of intestinal tract and several pathovars are important because of virulence factors leading to harm to the epithelial cells. A patient co-infected by *E. coli* and *H. pylori* was detected. The ELIZA kit and conventional biochemical tests were used for detection of *H. pylori* and *E. coli*, respectively. A 4 years old girl was diagnosed for anti *H. pylori* immunoglobulin G and a high rate of *E. coli* number (10^5 CFU/mL) was determined in the stool examination. There was no data regarding familial history of infection with *H. pylori*. This girl had a history of hospitalization in Salmas hospital. Clinical findings included: fever, diarrhea, chilling and dizziness. Co-infection of *H. pylori* and *E. coli* may complicate gastrointestinal disorders in children and if misdiagnosed or left untreated, there is the possibility of severe clinical outcomes.

1. Introduction

Helicobacter pylori (*H. pylori*) is a curved and spiral Gram-negative bacterium detected in the gastric and small intestine mucosa of a large proportion of humans around the world (> 50%). *H. pylori* infection is usually acquired during childhood and yet becomes chronic during adulthood if not treated[1]. Its prevalence enhances with age (cohort rather than age effect) and mainly is explained by changes in socioeconomic conditions. *H. pylori*, a heterogeneous bacterial species has pathogenic effect via several virulence factors, includes a highly pathogenic strain named *cagA* which promotes a strong inflammatory response, *vacA* which causes vacuolating of cells and activation of caspase cascade, *babA*, *sabA*, *oipA* and other factors[2]. *H. pylori* infection is commonly known to lead to a number of upper digestive diseases, particularly cancer and peptic ulcer, being a degenerative disease. In fact, the peptic ulcer is a result of infection, stress, chemical irritants and also genetic susceptibility. Furthermore, *H. pylori* infection was linked to several extra-digestive disorders, such as atherosclerosis, hypertension and stroke, that all of them were associated with Alzheimer's disease, an effect caused by impairment of the blood-brain barrier. *H. pylori* infection causes the malignant gastro-intestinal diseases such as gastric or duodenal ulcers and iron deficiency mediated anemia in children[3,4]. In addition, gastric inflammation occurs in all of patients, although *H. pylori* isolates are non-virulent and cannot penetrate the epithelial cells. The host responses mainly take place against it following the attachment of *H. pylori* to the epithelial cells of this area. The antigenic components of the bacteria are adsorbed by epithelial cells and pass the lamina propria, thus will interact and activate the B and T (mostly TH17 subtype) lymphocytes. Next, immunoglobulin G (IgG), IgA and to a lower amount IgM are produced in response to the infection. On the other hand, interleukins will be produced. Anti *H. pylori* IgG has been shown to has diagnostic use and be effective in treatment of several immune diseases especially inflammation types (gastric cancer, urticarial, lupus, kidney function, *etc*.)[5-9]. *Escherichia coli* (*E. coli*)isolates are colonizers of intestinal tract and several pathovars are important because of virulence factors leading to harm to the epithelial cells.

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2. Case presentation

Here, a 4 years old girl was diagnosed for anti *H. pylori* IgG and a high rate of *E. coli* number (10^5 CFU/mL) was determined in the stool examination. There was no data regarding familial history of infection with *H. pylori*. The patient had been hospitalized for 2 days and no history of antibiotic consumption was found. This girl had a history of hospitalization in Salmas hospital. The clinical findings included: fever, diarrhea, chilling and dizziness. The patient was treated for *E. coli*. The antibiotic susceptibility test for *E. coli* showed that it

was resistant to amoxicillin and cotrimoxazole, but susceptible to nitrofurantion, ceftriaxone, amikacin, nalidixic acid, gentamycin and ciprofloxacin.

3. Discussion

There are reports of *H. pylori* infection among pediatrics population, however the role of the bacterium in the inflammation, cancer initiation and anemia have yet to be fully elucidated[10,11]. The prevalence of *H. pylori* has been determined higher in Central/South American and Asian countries and at least two-fold higher in countries with high rate of gastric cancer and increased with age in exception of Chile, Ecuador, Mexico, Japan, Latvia and Republic of Korea[12].

In this study, serum antibody against *H. pylori* specific IgA was detected in a 4 years old child. Other serum parameters were not measured. Several studies have demonstrated the relation of *H. pylori* infection and iron mediated anemia, low ferritin and haemoglobin concentrations[13], growth parameters[14], recurrent abdominal pain[15], response of gastric mucosa[16], nausea, vomiting and diarrhea[17], IgG4-related non healing gastric ulcer[18] and Henoch-Schonlein purpura[19].

On the other hand, *E. coli* isolates may lead to fatal outcomes among children population. Here, we reported a child co-infected by *H. pylori* and *E. coli* exhibiting fever, diarrhea, chilling and dizziness. Although *E. coli* is a common colonizer of intestinal tract, a high number of the bacterium is important in some populations and thus there is the need of eradication of infection[20]. Furthermore, drug resistant strains are in development and detection of these strains is essential for accurate antibiotic therapy.

To the best our knowledge, no previous reports have been published regarding *H. pylori* and *E. coli* co-infection among pediatrics.

The most diarrhogenic pathogens among children in developing countries are rotavirus, cryptosporidium, enterotoxigenic *E. coli* producing heat-stable toxin and *Shigella* spp.[21]. We did not determine if the isolated *E. coli* was toxigenic in this child. A systematic review uncovered that rotavirus, callicivirus and enteropathogenic and enterotoxigenic *E. coli* are the causative agents of more than half of diarrhea cases in pediatrics population under 5 years, worldwide[22].

The limitations of this study were lack of exact detection of *H. pylori* and *E. coli* and characterization of these agents, no assessment of serum parameters and drawback in history data of the patient.

Conflict of interest statement

We declare that we have no conflict of interest.

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