Acute Gastroenteritis Agents Under 5 Years Old Age Children

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Abstract

Aim: Acute gastroenteritis outbreaks common health problem throughout the world especially in children. Every year thousands of children dies because of the diarrhea cause of bacterias, parasites and viral diseases. In this study we aim to find the rates of the agents cause diarrhoea, children under 5 years old according to the seasons.

Materials and methods: In this study 216 stool samples, children under 5 years old age, are examine with some tests for Rotaviruses, Adenoviruses, Salmonella, Shigella, Entamoeba and Giardia, Clostridium difficile (Toxin A, Toxin B). Gastroenteritis were tested for Clostridium difficile by means of enzyme-linked immunosassay (Toxin A, Toxin B). CerTest Rotavirus and Adenovirus Card Test (CerTest, Biotec, Spain), a qualitative immunochromatographic assay was used to detect rotavirus and adenovirus antigens. This immunochromatographic tests used for detecting Giardia and Entamoeba antigens too and most of the cases we support our results with the microscopy. They were also examined by ELISA for Clostridium difficile cytotoxins A and B. We used macconcey medium for finding the lactose negative colonies after that selenit-f media used for detecting only salmonella and shigella in the stool samples, the final results has been reached by the IMVIC tests.

Result: Infections results 40.74% rotavirus (adenovirus 13.42%, 5 case is mixed infections), bacteria 24.98% and parasites 20.82%. Some agents are peak in the cold seasons for example most Rotavirus outbreaks increased in winter: (November 11.36%, December 14.77%, January 13.76%, February 25%). In contrast some outbreaks occured in hot seasons especially Salmonella (June 21.42%, July 28.57%, August 35.71%) and Shigella (June 20 %, July 20%, August 30%) (Table 1).

Conclusion: This study find the highest proportion of dual diarrhoeal infections was identified in February, March and April and seasonal occurrence of some mono-infections; infection by rotavirus is more frequent in winter and spring. In conclusion we believe that analysis of viral antigens, bacterias and the parasites as a diarrheal agents in stool sample is important in 0-5 years old infants because of hospitalizations and unnecessary drugs.

Keywords: Child; Diarrhoea; Gastroenteritis

Introduction

Acute gastroenteritis is one of the most common health problems worldwide [1]. Acute infectious diarrhea is a common disease in young children throughout the world too. Estimated incidence rates in developing countries range from 3.5 to 7.0 episodes per child per year during the first 2 years of life and from 2 to 5 episodes per child per year for the first 5 years [2]. Pediatric diarrhea is a costly disease in terms of direct (and indirect) monetary costs to each community, and it is a cause of emotional trauma for the child and the parents [3].

More than 700 million cases are estimated to occur annually in children less than 5 years of age, resulting in few deaths in developed countries, but more than 2 million deaths in developing countries. Worldwide, a diverse group of viral, bacterial, and parasitic pathogens cause acute enteric symptoms including nausea, vomiting, abdominal pain, fever, and acute diarrhea. Infections with viral agents, unlike those with bacterial or parasitic pathogens, cannot be treated with antibiotics, and many cannot be prevented by improvements in quality of drinking water, food, or sanitation. Until the early 1970s most viral agents causing gastroenteritis in humans were largely unknown. Studies using electron microscopy of intestinal contents resulted in the discovery of numerous viral enteropathogens now classified Rotaviruses, ‘enteric’ Adenoviruses or other viruses which can cause gastroenteritis [1].

Among them, viral infection is the most common cause, followed by bacterial and parasitic infections [4]. Giardia lamblia, Entamoeba histolytica, are the major parasitic agents [5]. Salmonella spp and Shigella spp remain among the bacteria most frequently isolated from stool samples obtained from diarrhea patients, especially in rural areas from developing countries [6,7]. Other of this diarrheal agents Clostridium difficile is emerging as a major cause of childhood diarrhea in both community and hospital settings [8,9]. Clostridium difficile infection has more recently been implicated as an increasingly prevalent diarrheal pathogen in children [10-12].
Moreover, evidence suggests that a large proportion of pediatric Clostridium difficile cases are community-acquired infections and that many of these infections lack the traditional risk factor of exposure to antimicrobial drugs [13-15]. In this study we aim to find the prevalence of these gastroenteritis agents under 5 years old children.

Materials and Methods

The study group comprised 216 children admitted consecutively for diarrhea to this hospital during a period of one year. The patients were chosen if they had diarrhea on admission, irrespective of other concomitant diseases. Children who had been treated with antibiotics before the onset of diarrhea were included too. Samples were obtained by direct deposition in a sterile container and were transported the same day to hospital laboratories, where they were stored at 4-8 °C until they were processed. Specimens for bacteriological culture were inoculated into appropriate media on the day of collection.

Stool specimens from each infant with severe gastroenteritis were tested for Clostridium difficile by means of enzyme-linked immunosassay. CerTest Rotavirus and Adenovirus Card Test (CerTest, Biotec, Spain), a qualitative immunochromatographic immunoassay. CerTest Rotavirus and Adenovirus Card Test were tested for Clostridium difficile by means of enzyme-linked immunosorbent assay. ELISA was used to detect Rotavirus and Adenovirus antigens. This immunochromatographic tests used for detecting Giardia and Entamoeba antigens too and most of the cases we support our finding with the immunofluorescence microscopy. They were also examined by ELISA for Clostridium difficile cytotoxins A and B. We used Macconkey medium for detecting the lactose negative colonies after that Selenit-F media used for detecting only Salmonella and Shigella in the stool samples. We don't find the serotypes of this bacterias. In this study we use IMViC tests define as symptoms of diarrhea not attributable to another cause.

Table 1: Number of gastroenteritis agents.

| Month     | January | February | March | April | May | June | July | August | September | October | November | December | TOTAL |
|-----------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|-------|
| Giardia spp. | 1.52    | -        | 2.105 | 2.105 | 1.52| 3.157| 3.157| 4.210  | -7.6      | 1.52   | 2.105    | -        | 19.00 |
| Entamoeba spp. | -     | 1.38     | 1.38  | 3.115 | 2.76| 4.153| 5.192| 6.230  | 2.10      | -      | 1.38     | 1.384    | 26.10 |
| Clostridium difficile | 2.66   | 2.66     | -     | 3.10  | 2.66| 3.10  | 4.133| 7.233  | 37.1      | 13.3   | 3.10     | -        | 30.10 |
| Salmonella spp. | -      | -        | -     | -     | 17.1| -     | 3.214| 4.285 | 5.357     | 1.103  | -        | -        | 14.10 |
| Shigella spp. | 1.10    | -        | -     | -     | 1.10| 2.20  | 2.20 | 3.30   | -         | 1.10   | -        | -        | 10.10 |
| Adenovirus | -       | 2.68     | 2.68  | 3.103 | 2.68| 4.137| 2.68 | 2.68   | 3.103     | 3.103  | 2.68     | 4.68     | 29.10 |
| Rotavirus | 3.137   | 2.225    | 8.90  | 4.45  | 3.34| -     | -   | 1.11   | 7.79      | 8.90   | 10.113   | 13.147   | 88.10 |
| Total Number | 16      | 27       | 13    | 15    | 12  | 19    | 20   | 28     | 16        | 14     | 18       | 18       | 216   |

Discussion

Acute gastroenteritis in children continues to be a significant problem throughout the world. Worldwide more than 744-1000 million cases of acute diarrhoeal disease are estimated to occur annually just in children under 5 years old [16]. Of the estimated total 10.6 million deaths among children under five years of age worldwide, 42 percent occur in the World Health Organization (WHO African region) [17]. Throughout the world global estimates of the number of deaths due to diarrhea have shown like [18], from 4.6 million in the 1980s [16] to 3.3 million in the 1990s [19] to 2.5 million in the year 2000 [20].

Some studies refers that enterotoxigenic Rotaviruses predominate in developing areas, cytotoxigenic Clostridium difficile are seen with increasing frequency in developed areas; and Shigella, Salmonella, and Giardia lambia are found throughout the world [21]. In Netherland viruses were detected in 82% of the...
samples, with Rotavirus being most common (56%), bacteria in 32% and parasites in 10% [22]. Our study consistent with these study 40.74% Rotavirus (Adenovirus 13.42% 5 case is mixed infections), bacteria 24.98% and parasites 20.82% (Table 1). Most of the studies mentioned that mixed infections are less frequent than mono-infections, but the rate of double infections varies widely in the literature [23]. A study in Spain find the most frequent mixed infections were Rotavirus-Astrovirus (13 cases) and Rotavirus-Adenovirus (10 cases in 820 stool samples) [23] In this study Rotavirus and Adenovirus mix infection 5 of 216 sample (2.31%) (Table 1). This study find the highest proportion of dual infections was identified in February, March and April and seasonal occurrence of some mono-infections; infection by Rotavirus is more frequent in winter and spring. In Spain most of the cases of mixed infection occurred in autumn (26 cases in autumn, five in winter, six in spring but only two cases in summer), and no seasonal differences were detected between the different co-infections [23].

As seen in the present study Rotavirus is a most common detected antigen 40.74% for acute childhood diarrhea. These findings are consistent with other investigations in İzmir Rotavirus found 39.8% of 920 children [24]. We found Clostridium difficile infection (CDI) rate 13.88%. Some researchers find the incidence of CDI in the pediatric population appears to be increasing in US hospitals [25]. Our study has got some limitations because there is few investigations done in Erzurum before so our results are close for Rotavirus and Adenoviruses [26].

Entero viral pathogens were the most significant causative agents bacterial pathogens were also important contributors to pediatric diarrhea in Tripoli [27]. Resembling in Tripoli in this study viral pathogens detected 54.16% sample, bacterial pathogens detected 24.98% and parasitic agents detected 20.82% of all samples.

Entamoeba histolytica, Giardia lamblia, and Cryptosporidium parvum are considered to be the most important diarrheal agents [28-32]. We search Entamoeba and Giardia infections in our study. Giardia lamblia infections are very common throughout the world and are considered one of the main nonviral causes of diarrhea in industrialized countries [32]. For many years, microscopic examination of stool samples has been considered to be the “gold standard” for diagnosis of Entamoeba histolytica, Giardia lamblia and some parasites. Recently, more specific and sensitive alternative methods (PCR, ELISA) have been introduced for all these parasitic infections. We search these parasites with microscobic examination and we found Giardia spp 8.79% and Entamoeba spp 12.03% of all samples. These numbers shows us that parasitic infections are incontrovertible cause of acute diarrhea.

Conclusion

In conclusion analysis of viral antigens, bacteria and the parasites as a diarrheal agents in stool sample is important in 0-5 years old infants, in order to predict clinical outcome, prevent inappropriot antibiotic use and hospitalizations.

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