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Prevalence and Clinical Laboratory Features of Cryptosporidiosis in Children Under 5 Years of Age: A Cross-Sectional Study of Hospital Cases of Acute Intestinal Infection

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Background. *Cryptosporidium* protozoa are the leading causative agent of diarrhea and cause of death in children under 5 years of age. The role of cryptosporidia in the development and course of acute intestinal infections (AII) in children in Russia remains unstudied. **Objective.** Our aim was to study the prevalence and clinical laboratory features of cryptosporidium-associated AII in children under 5 years of age. **Methods.** A cross-sectional study (conducted in March-June 2017) included children admitted to hospital with symptoms of AII (fever, loose watery stools, weakness, decreased appetite and/or vomiting) by the ambulance service. On admission, stool samples were collected from all patients. *Cryptosporidium* oocysts were determined by microscopic examination of faecal smears stained according to Tsil-Nielsen after preliminary concentration by a modified formalin-ether technique. The presence of intestinal pathogens was determined by a bacteriological technique and using a polymerase chain reaction. **Results.** The study included 107 children with AII (girls — 51%). Cryptosporidia were detected in 28 (26%) patients, in 93% of cases — together with bacterial and/or viral pathogens. The etiological structure of cryptosporidium-associated AII and AII in cryptosporidiosis negative children ($n = 79$) did not differ. On admission, children with cryptosporidium-associated AII had a higher blood leukocyte count — $13.0_{-109} / L$ (9.2; 16.0) versus $8.3_{-109} / L$ (6.1; 11.2) in children without cryptosporidiosis ($p < 0.001$). It has been also found that antibiotics were more often used in the treatment of children with cryptosporidium-associated AII — in 21 (75%) versus 39 (49%) in the comparison group ($p = 0.026$). **Conclusion.** Cryptosporidia are detected in every fourth child with AII under 5 years of age. Patients with cryptosporidia are distinguished by a higher level of blood leukocytes upon admission and a more frequent prescription of antibiotics than in the group of cryptosporidiosis negative patients.

Key words: children, acute intestinal infection, acute gastroenteritis, aetiology, cryptosporidiosis, rotavirus infection, prevalence.

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RESULTS

Table 1. The etiological structure of acute intestinal infections

Pathogens	Cryptosporidiosis(+) <i>n</i> =28, abs. (%)	Cryptosporidiosis(-) <i>n</i> =79, abs.	<i>p</i>
No bacteria found	9 (32)	35 (44)	0.254
<i>Pseudomonas aeruginosa</i>	0 (0)	7 (9)	0.186
<i>Staphylococcus aureus</i>	4 (14)	4 (5)	0.330
<i>Enterobacter aerogenes</i>	1 (4)	3 (4)	0.495
<i>Salmonella spp.</i>	3 (11)	2 (3)	0.366
Salmonellosis	5 (18)	8 (10)	0.343
<i>Klebsiella oxytoca</i>	0 (0)	3 (4)	1.000
<i>Escherichia coli</i>	0 (0)	2 (3)	1.000
<i>Citrobacter braakii</i>	1 (4)	1 (1)	0.320
<i>Campylobacter spp.</i> + <i>Staphylococcus aureus</i> + <i>Klebsiella oxytoca</i>	0 (0)	1 (1)	1.000
<i>Staphylococcus aureus</i> + <i>Pseudomonas aeruginosa</i>	1 (4)	0 (0)	1.000
<i>Staphylococcus aureus</i> + <i>Enterobacter spp.</i>	1 (4)	1 (1)	0.320
<i>Staphylococcus aureus</i> + <i>Salmonella spp.</i>	0 (0)	2 (3)	1.000
<i>Salmonella spp.</i> + <i>Enterobacter aerogenes</i>	1 (4)	0 (0)	1.000
<i>Staphylococcus aureus</i> + <i>Enterobacter aerogenes</i> + <i>Pseudomonas aeruginosa</i>	0 (0)	1 (1)	1.000
<i>Proteus mirabilis</i>	0 (0)	1 (1)	1.000
<i>Campylobacter spp.</i> + <i>Salmonella spp.</i>	0 (0)	3 (4)	1.000
<i>Salmonella spp.</i> + <i>Salmonella typhimurium</i>	0 (0)	1 (1)	1.000
<i>Staphylococcus aureus</i> + <i>Klebsiella oxytoca</i>	0 (0)	2 (3)	1.000
<i>Serratia odorifera</i>	0 (0)	1 (1)	1.000
<i>Campylobacter spp.</i> + <i>Klebsiella pneumoniae</i>	1 (4)	0 (0)	1.000
<i>Pseudomonas aeruginosa</i> + <i>Serratia marcescens</i>	1 (4)	0 (0)	1.000
No viruses found	9 (32)	14 (18)	0.213
Rotavirus	16 (57)	59 (75)	0.085
Rotavirus + norovirus	1 (34)	3 (4)	1.000
Norovirus	2 (7)	1 (1)	0.367
Rotavirus + astrovirus	0	1 (1)	1.000
Astrovirus	0	1 (1)	1.000

Table 2. Characteristics of children with AII upon admission: a comparison of groups of patients with diagnosed cryptosporidiosis and AII of other aetiology

Pathogens	Cryptosporidiosis(+) n =28, abs. (%)	Cryptosporidiosi s(-) n =79, abs.	p
Age, months	19 (12; 36)	12 (11; 24)	0.139
Sex (girls), abs. (%)	15 (53.6)	40 (50.6)	0.829
Number of stools, abs.	3 (2; 6)	4 (2; 7)	0.748
Body temperature, °C	38.8 (38.1; 39.4)	38.6 (37.9; 39.1)	0.410
White blood cells, $\times 10^9 / L$	13.0 (9.2; 16.0)	8.3 (6.1; 11.2)	0.001
ESR, mm / h	8 (5; 10)	8 (5; 15)	0.461
Undulant course of AII*, abs. (%)	3 (11)	7 (9)	0.722
Readmission**, abs. (%)	1 (4)	3 (4)	1.000
Infusion therapy, abs. (%)	13 (46)	47 (59)	0.271
Prescription of intestinal antiseptics, abs. (%)	19 (68)	63 (80)	0.206
Prescription of antibiotics, abs. (%)	21 (75)	39 (49)	0.026
Prescription of antiviral drugs	10 (36)	41 (52)	0.187

Note. * — undulant course of AII (repetitive occurrence/aggravation of AII symptoms against the background of disappearance of acute infection manifestations during hospitalization — 14 days); ** — readmission (admission to a hospital within 2 months after AII hospitalization). AII — acute intestinal infection, ESR — erythrocyte sedimentation rate.

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CONFLICT OF INTERESTS

Not declared.