

**ORIGINAL RESEARCH****Risk factors of Gastroenteritis in children**

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**ABSTRACT**

**Background:**Infectious diarrheal diseases are a significant cause of morbidity and mortality in children worldwide, particularly in developing countries with poor sanitation and hygiene practices. The present study was conducted to assess risk factors of Gastroenteritis in children. **Materials & Methods:**98 children with diarrhea of both genders were selected. Gastroenteritis cases were put on group I and healthy control in group II. Stool collection was achieved via sterile plastic containers provided with screw capes with spoon. Cary Blair transport media was used for preservation of samples. Stools were processed and analyzed for enteric bacteria. **Results:** Out of 98 cases of children with diarrhea, enteropathogens were isolated in 36 cases (Group I) and 6 control (Group II). Shigella spp. in 12 and 2, E. coli in 10 and 1, Salmonella spp. in 5 and 2, Aeromonas spp. in 7 and 1 and Y. enterocolitica in 2 cases in group I and II respectively. The difference was significant ( $P < 0.05$ ). Mother education was high in 12 and 2 and low in 24 and 4 cases in group I and II respectively. Age groups 0-6years had 25 and 3 cases and age group 7-12years had 11 and 3 cases in group I and II respectively. Family income was high in 15 and 2 and low in 21 and 4 cases respectively. In group I, 26 cases were seen in females and 10 cases in males and in group II, 5 cases in females and 1 case in male. The difference was significant ( $P < 0.05$ ). **Conclusion:** The study's findings highlight the significance of bacterial enteropathogens in the development of severe pediatric diarrhea. It was E. coli that was the most common pathogen.

**Keywords:**diarrhea, Gastroenteritis, Stool

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**INTRODUCTION**

Infectious diarrheal diseases are a significant cause of morbidity and mortality in children worldwide, particularly in developing countries with poor sanitation and hygiene practices. These diseases are primarily caused by various pathogens, including bacteria, viruses, and parasites, and can lead to dehydration, malnutrition, and even death if not promptly treated.<sup>1</sup>

Common pathogens responsible for infectious diarrheal diseases in children include Escherichia coli (E. coli), Salmonella, Shigella, Campylobacter, and Vibrio cholerae, Rotavirus, norovirus, adenovirus, and enteric viruses.<sup>2</sup> Giardia lamblia, Cryptosporidium, and Entamoeba histolytica.<sup>3</sup> These pathogens are typically transmitted through contaminated food and water, poor hygiene practices, inadequate sanitation, and close contact with infected individuals.<sup>4</sup> Symptoms of infectious diarrheal diseases in children may include diarrhea (frequent loose or watery stools), abdominal pain, fever, vomiting, and dehydration. The severity and duration of symptoms can vary depending on the causative

agent and the child's immune status.<sup>5</sup> Dehydration is the most common complication of infectious diarrheal diseases in children and can lead to electrolyte imbalances, metabolic acidosis, and shock if not promptly treated. Malnutrition, weight loss, growth stunting, and cognitive impairment may also occur, particularly with repeated or prolonged episodes of diarrhea.<sup>6</sup> The present study was conducted to assess risk factors of Gastroenteritis in children.

**MATERIALS & METHODS**

The present study consisted of 98 children with diarrhea of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Gastroenteritis cases were put on group I and healthy control in group II. Stool collection was achieved via sterile plastic containers provided with screw capes with spoon. Cary Blair transport media was used for preservation of samples. Stools were processed and analyzed for enteric bacteria. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

**RESULTS****Table I Enteropathogens isolated from stool specimens**

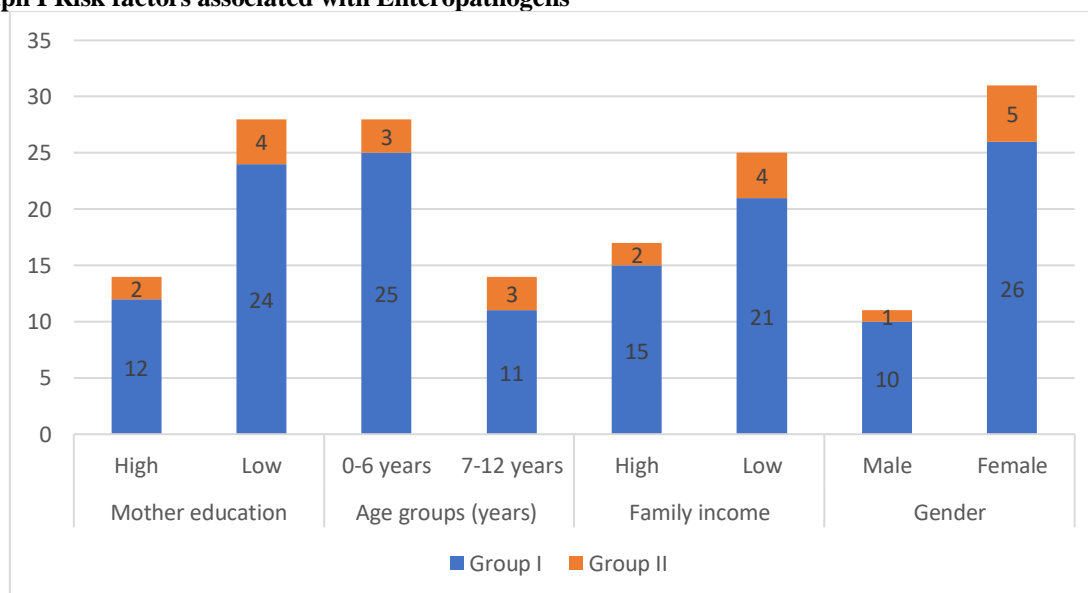
Enteropathogens	Group I (98)	Group II (98)	P value
Shigella spp.	12	2	0.01
E. coli	10	1	
Salmonella spp.	5	2	
Aermonas spp.	7	1	
Y. enterocolitica	2	0	
Total	36	6	

Table I shows that out of 98 cases of children with diarrhea, enteropathogens were isolated in 36 cases (Group I) and 6 control (Group II). Shigella spp. in 12 and 2, E. coli in 10 and 1, Salmonella spp. in 5 and 2, Aermonas spp. in 7 and 1 and Y. enterocolitica in 2 cases in group I and II respectively. The difference was significant ( $P < 0.05$ ).

**Table II Risk factors associated with Enteropathogens**

Risk factors	Variables	Group I	Group II	P value
Mother education	High	12	2	0.01
	Low	24	4	
Age groups (years)	0-6	25	3	0.03
	7-12	11	3	
Family income	High	15	2	0.02
	Low	21	4	
Gender	Male	10	1	0.04
	Female	26	5	

Table I shows that mother education was high in 12 and 2 and low in 24 and 4 cases in group I and II respectively. Age groups 0-6 years had 25 and 3 cases and age group 7-12 years had 11 and 3 cases in group I and II respectively. Family income was high in 15 and 2 and low in 21 and 4 cases respectively. In group I, 26 cases were seen in females and 10 cases in males and in group II, 5 cases in females and 1 case in male. The difference was significant ( $P < 0.05$ ).

**Graph I Risk factors associated with Enteropathogens****DISCUSSION**

Since infectious diarrheal illnesses cause significant morbidity and mortality, particularly in underdeveloped nations, they are a major global health concern.<sup>7</sup> According to reports, diarrheal illnesses kill around three million people globally each year.<sup>8</sup> Since diarrheal disorders are most common in developing nations, antimicrobial resistance in

enteric pathogens is crucial. Enteric infections in underdeveloped nations are increasingly becoming resistant to antibiotics, which is a serious cause for concern.<sup>9</sup>

We found that out of 98 cases of children with diarrhea, enteropathogens were isolated in 36 cases (Group I) and 6 control (Group II). Shigella spp. in 12 and 2, E. coli in 10 and 1, Salmonella spp. in 5 and 2,

*Aeromonas* spp. in 7 and 1 and *Y. enterocolitica* in 2 cases in group I and II respectively. Jarousha et al<sup>10</sup> investigated the etiology of bacterial enteropathogens causing diarrhea among children; to elucidate the risk factors, sign and symptoms involved in developing of infection; and to identify the antimicrobial susceptibility pattern. Ninety- three of diarrheal cases comprising enteropathogen isolates. A recognized bacterial enteric pathogen was identified in 31% of the cases and 8% of the control group. The frequency of isolated enteropathogens from faeces of diarrheal cases was recorded in the following order, Enterohemorrhagic *E. coli* 8.3%, *Shigella* spp. 6.7%, *Campylobacter jejuni* 5%, *Salmonella* spp. 4%, *Yersinia enterocolitica* 2.7%, *Aeromonas* spp. 4.7%, and *Plesiomonas* spp. 1.3%. *E.H.E coli*, *Shigella* and *Salmonella* had shown a significant statistical association with diarrhea. Compared to matched uninfected control, multivariate analysis revealed that malnutrition status was the only independent factor associated with infection. Antibiotic susceptibility profile indicated that enteropathogens were generally susceptible to meropenem, ceftriaxone, followed by amikacin and ciprofloxacin. Almost all enteropathogens were resistant to ampicillin and amoxicillin.

We found that mother education was high in 12 and low in 24 and 4 cases in group I and II respectively. Age groups 0-6 years had 25 and 3 cases and age group 7-12 years had 11 and 3 cases in group I and II respectively. Family income was high in 15 and 2 and low in 21 and 4 cases respectively. In group I, 26 cases were seen in females and 10 cases in males and in group II, 5 cases in females and 1 case in male. Jafari et al<sup>11</sup> in their study a total of 369 (45.6%) bacterial pathogens were recovered from 808 patients as follows: *Shigella* spp., 155 (45.6%); diarrheagenic *Escherichia coli* 143 (38.8%); *Salmonella* spp., 51 (13.8%); and *Campylobacter* spp., 20 (5.4%). Most of the diarrheagenic *E. coli* were Shiga toxin-producing *E. coli*, with 64 (44.7%) isolates, followed by 47 (32.9%) enterotoxigenic *E. coli* isolates; among *Shigella* spp. isolates, 69 (44.5%) *Shigella flexneri* were predominant. The molecular diagnosis of enteropathogens yielded a more accurate characterization of the prevalence of diarrhea-causing bacterial strains in Iran. The present study revealed a high prevalence of *Shigella* and diarrheagenic *E. coli* as the predominant causes of bacterial diarrhea in this region of the world.

Albert et al<sup>12</sup> in their study potential enteric pathogen was isolated from 74.8% of diarrheal children and 43.9% of control children ( $P = 0.0001$ ). It identified rotavirus, *Campylobacter jejuni*, enterotoxigenic *Escherichia coli*, *Shigella* spp. and *Vibrio cholerae* O1 as major pathogens. The present study identified these pathogens as being significantly associated with diarrhea. In addition, the study also identified six additional agents, including enteropathogenic *E. coli*, *Aeromonas* spp., *V. cholerae* O139, enterotoxigenic *Bacteroides fragilis*, *Clostridium difficile*, and

*Cryptosporidium parvum*, as being significantly associated with diarrhea. *Plesiomonas shigelloides*, *Salmonella* spp., diffusely adherent *E. coli*, enteroaggregative *E. coli*, *Entamoeba histolytica*, and *Giardia lamblia* were not significantly associated with diarrhea. Enteroinvasive *E. coli*, enterohemorrhagic *E. coli*, and *Cyclospora cayentanensis* were not detected in any of the children. The major burden of diseases due to most pathogens occurred in the first year of life. As in the previous study, seasonal patterns were seen for diarrhea associated with rotavirus, *V. cholerae*, and enterotoxigenic *E. coli*, and infections with multiple pathogens were common.

The limitation of the study is the small sample size.

## CONCLUSION

The study's findings highlight the significance of bacterial enteropathogens in the development of severe pediatric diarrhea. It was *E. coli* that was the most common pathogen.

## REFERENCES

- Mandomando I, Jaintilal D, Pons MJ, et al. Antimicrobial susceptibility and mechanisms of resistance in *Shigella* and *Salmonella* isolates from children under 5 years of age with diarrhea in rural Mozambique. *Antimicrob Agents Chemother.* 2009;53:2450-4.
- Nimri LF, Meqdam M. Enteropathogens associated with cases of gastroenteritis in a rural population in Jordan. *Clin Microbiol Infect.* 2004;10:634-9.
- Vu Nguyen T, Le Van P, Le Huy C, Nguyen Gia K, Weintraub A. Etiology and epidemiology of diarrhea in children in Hanoi, Vietnam. *Int J Infect Dis.* 2006;10:298-308.
- Tjaniadi P, Lesmana M, Subekti D, et al. Antimicrobial resistance of bacterial pathogens associated with diarrheal patients in Indonesia. *Am J Trop Med Hyg.* 2003;68:666-70.
- Chisti MJ, Faruque AS, Khan WA, Das SK, Zayed MB, Salam MA. Characteristics of children with *Shigella* encephalopathy: experience from a large urban diarrhea treatment center in Bangladesh. *Pediatr Infect Dis J.* 2010;29:444-7.
- Chompook P, Todd J, Wheeler JG, von Seidlein L, Clemens J, Chaicumpa W. Risk factors for shigellosis in Thailand. *Int J Infect Dis.* 2006;10:425-33.
- Nielsen H, Hansen KK, Gradel KO, et al. Bacteraemia as a result of *Campylobacter* species: a population-based study of epidemiology and clinical risk factors. *Clin Microbiol Infect.* 2010;16:57-61.
- Wang SC, Chang LY, Hsueh PR, et al. *Campylobacter* enteritis in children in northern Taiwan- A 7-year experience. *J Microbiol Immunol Infect.* 2008;41:408-13.
- Surek M, Vizzotto BS, Souza EM, et al. Identification and antimicrobial susceptibility of *Aeromonas* spp. isolated from stools of Brazilian subjects with diarrhoea and healthy controls. *J Med Microbiol.* 2010;59:373-4
- Al Jarousha AM, El Jarou MA, El Qouqa IA. Bacterial enteropathogens and risk factors associated with childhood diarrhea. *The Indian Journal of Pediatrics.* 2011 Feb;78:165-70.

11. Jafari F, Shokrzadeh L, Hamidian M, Salmanzadeh-Ahrabi S, Zali MR. Acutediarrhea due to enteropathogenic bacteria in patients at hospitals in Tehran. *Jpn J Infect Dis.* 2008;61:269–73.
12. Albert MJ, Faruque AS, Faruque SM, Sack RB, Mahalanabis D. Case-control study of enteropathogens associated with childhood diarrhea in Dhaka, Bangladesh. *J Clin Microbiol.* 1999;37:3458– 64.