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ORIGINAL ARTICLE

ASSESSMENT OF HOSPITAL ACQUIRED CLOSTRIDIUM DIFFICILE INFECTION IN PAEDIATRIC PATIENTS: A RETROSPECTIVVE STUDY

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ABSTRACT:
Background: One of the most challenging tasks in terms of anaesthesia is the management of postoperative pain. Despite **Background:** Clostridium difficile infection (CDI) is caused by Clostridium difficile is a gram-positive, spore-forming, anaerobic bacillus that can colonize the gastrointestinal tract.. CDI has a wide variation in severity, ranging from asymptomatic colonization to severe diarrhea, pseudomembranous colitis, toxic megacolon, bowel perforation and death. Incidence of CDI can be reduced by identification of potentially modifiable risk factors in vulnerable population. Hence; we evaluated the incidence and frequency of C. difficile along with its risk factors in a paediatric hospital. **Materials & methods:** The present study was conducted in the paediatric hospital and included 325 paediatric patients that were admitted who were diagnosed with diarrhoea and ICD (International Classification of Diseases) code for C. Difficile between June 2012 and July 2014. Demographic details of the patients with underlying diseases, implicated antibiotics, and length of antibiotic usage were noted. Additionally, the internal laboratory records for all CD-positive stools were reviewed. Adherence was pooled across periods and hand hygiene moments and was reported as a percentage of total hand hygiene opportunities. All the results were analyzed by SPSS software. Chi-square test and student t test were used for assessment of level of significance. **Results:** Mean age of the patients in the two study groups was 2.75 and 5.85 years respectively. Significant correlation was obtained while comparing the mean age of the paediatric patients, presence of underlying chronic disease and ICU stay. Significant correlation was obtained while comparing the solid organ tumour, congenital heart disease and oncology stay in between CDI and Non-CDI paediatric study groups. **Conclusion:** Importance of antibiotic programs is emphasized by prior antibiotic exposure which was found to be risk factor.
Key words: Clostridium difficile, Diarrhoea

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NTRODUCTION

Clostridium difficile infection (CDI) is caused by Clostridium difficile is a gram-positive, spore-forming, anaerobic bacillus that can colonize the gastrointestinal tract.. CDI has a wide variation in severity, ranging from asymptomatic colonization to severe diarrhea, pseudomembranous colitis, toxic megacolon, bowel perforation and death. In recent years, the incidence, number of hospitalizations, associated deaths and severity of CDI in adults has been increasing.[1, 2] Tai et al examined demographic and healthcare utilization factors, but were unable to obtain individual medication data.[3] Various studies hypothesize that children with cancer may have an increased risk of CDI due to their underlying malignancy, exposure to chemotherapy, broad-spectrum antibiotics, and supportive medications. Identifying potentially modifiable risk factors could lead to a reduction in CDI in this vulnerable population.[4] Hence; we evaluated the incidence and frequency of C. difficile along with its risk factors in a paediatric hospital.

MATERIALS & METHODS

The present study was conducted in the paediatric hospital and included 325 paediatric patients that were admitted who were diagnosed with diarrhoea and ICD (International Classification of Diseases) code for C. Difficile between June 2012 and July 2014. Demographic

details of the patients with underlying diseases, implicated antibiotics, and length of antibiotic usage were noted. Ethical clearance was taken from the ethical committee of the institution in written after explaining them the entire research protocol. The distribution of diarrhea-associated hospitalizations by etiology and the rates of CD diarrheal diseases in patients were established. Additionally, the internal laboratory records for all CD-positive stools were reviewed. To help assess the role of CDI in the pediatric population, patients were divided into seven age groups with potentially differing susceptibility to CDI. Children with community acquired diarrhoea were excluded from the study. A case–control study was conducted, comparing CDI patients with non-CDI patients who had diarrhea. The control group consisted of children who developed diarrhoea 48 h after hospitalization in which CDI was investigated, but toxin A and/or toxin B were negative for C. difficile in stool specimens. CDI was defined as the presence of the following two findings: (1) diarrhea defined as three or more unformed stools within 24 h, (2) a positive cytotoxic stool assay for the presence of toxin A and/or toxin B. Qualitative detection of toxins A and B of C. Difficile was performed using Premier toxins A and B (C. difficile) EIA kit. Within each ward, observer nurses measured hand hygiene adherence at specific hand hygiene moments (before entering patient room, after leaving patient room, before aseptic procedure, and after body fluid contact) on a quarterly basis through the study period, as per provincial guidelines. Adherence was pooled across periods and hand hygiene moments and was reported as a percentage of total hand hygiene opportunities. All the results were analyzed by SPSS software. Chi-square test and student t test were used for assessment of level of significance.

RESULTS

Graph 1 highlights the demographic and univariate analysis of the paediatric patients included in the present study. Mean age of the patients in the two study groups was 2.75 and 5.85 years respectively. **Table 1** shows P-value for the comparison of demographic parameters in between in the two study groups. Significant correlation was obtained while comparing the mean age of the paediatric patients, presence of underlying chronic disease and ICU stay. **Graph 2** shows the multivariate analysis of the paediatric patients included in the study. **Table 2** highlights the P-value for the comparison of multivariate parameters in between in the two study groups. Significant correlation was obtained while comparing the solid organ tumour, congenital heart disease and oncology stay in between CDI and Non-CDI paediatric study groups.

Graph 1: Demographic and univariate analysis of the paediatric patients included in the study.

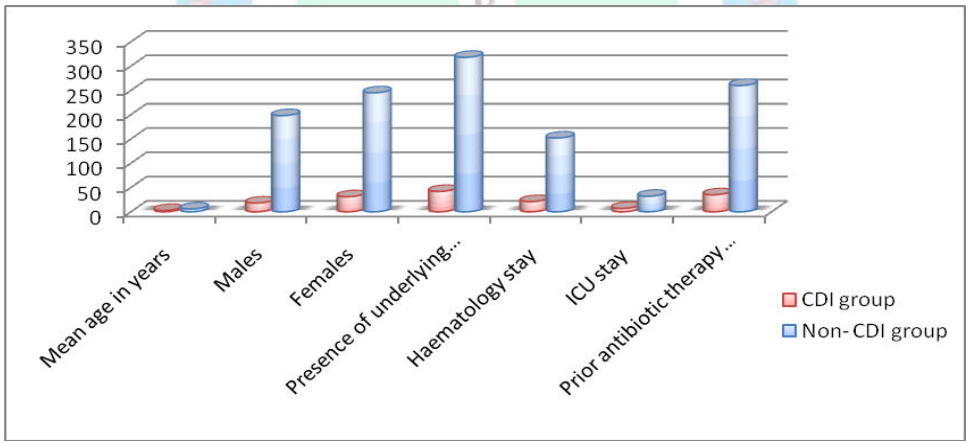

Table 1: P-value for the comparison of demographic parameters in between in the two study groups

Parameter	p-value
Mean age in years	<0.05*
Sex	>0.05
Presence of underlying chronic diseases	<0.05*
Haematology stay	<0.05*
ICU stay	<0.05*
Prior antibiotic therapy before CDI	>0.05

Graph 2: Multivariate analysis of the paediatric patients included in the study

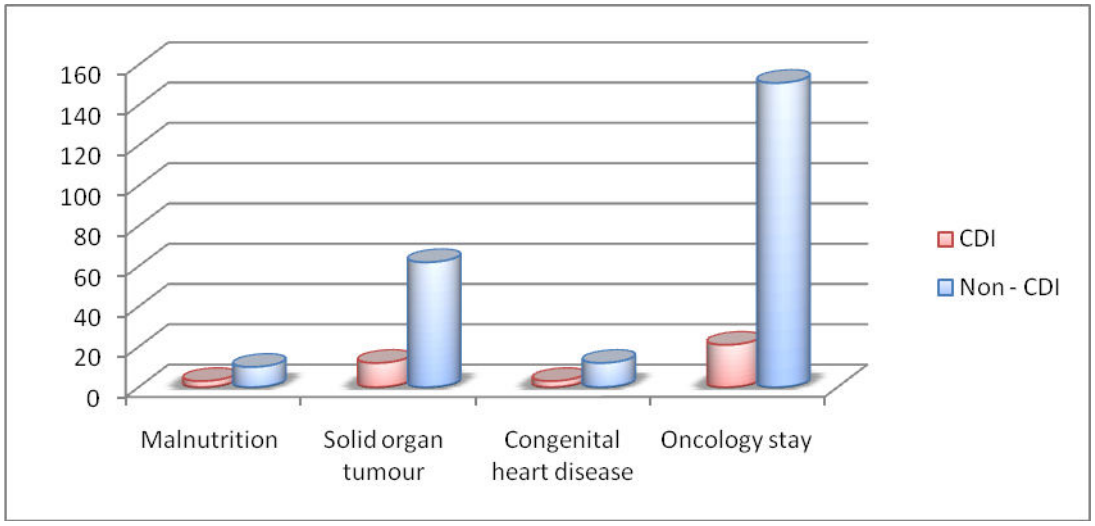

Table 2: P-value for the comparison of multivariate parameters in between in the two study groups

Parameter	p-value
Malnutrition	>0.05
Solid organ tumour	<0.05*
Congenital heart disease	<0.05*
Oncology stay	<0.05*

DISCUSSION

In 1935, Clostridium difficile (CD) was first described. The bacteria was found in stool specimens from healthy neonates, which led to its classification as a commensal, and was not first associated with disease until 1978.[5, 6] Currently, CD is one of the main factors of nosocomial infections that cause a spectrum of antibiotic-associated colitis (AAC), ranging from mild diarrhea to toxicmegacolon. Antibiotic exposure represents the principal risk factor for CDI, and existing research estimates that inpatients taking antibiotics are, on average, 60% more likely to acquire the infection.[7] Prolonged antibiotic exposure and exposure to larger antibiotic doses are associated with increased *C difficile* infection risk,2 and some antibiotics (clindamycin, cephalosporins, and fluoroquinolones) are associatedwitha greater risk relative toother antibiotic classes. Risk may increase over time with increased prescribing of certain antimicrobials.[8] Hence; we evaluated the incidence and frequency of C. difficile along with its risk factors in a paediatric hospital.

In the present study, we found the incidence of CDI in hospitalized children to be less than.4 percent 2012. Newborns rarely develop symptomatic *C. Difficile* infection because of the protective effect of maternal antibodies, premature immune system and maybe the lack of intestinal receptors for *C. difficile* toxins.[9, 10] We hypothesize that the marked effects of ward-level antibiotic exposure rate are likely explained by an increase in the number of patients colonized with, and shedding, C difficile in wards with high rates of antibiotic use. This high prevalence of antibiotic usewould increase environmental contamination and the incidence of C difficile infection. Karaaslan et al evaluated the incidence and potential risk factors for CDI in hospitalized children who developed diarrhoea. They evaluated 12,196 children who were hospitalized, among them 986 (8 %) children with diarrhea were investigated for CDI and 100 (0.8 %) children were diagnosed with CDI. The incidence of CDI in hospitalized children was 4/1000, 9/1000 and 9/1000 patients per year in year 2012, 2013 and 2014, respectively. From the results, they concluded that one of the most important risk factor was prior antibiotic exposure which emphasizes the importance of antibiotic stewardship programs.[11] Brown et al obtained a complete portrait of inpatient risk that incorporates innate patient risk factors and transmission risk factors measured at the hospital ward level and to investigate ward-level rates of antibiotic use and CDI risk. A 46-month retrospective cohort study of inpatients 18 years or older in a large, acute care teaching hospital composed of 16 wards, including 5 intensive care units and 11 non-intensive care unit wards. They observed that a total of 255 of 34 298 patients developed CDI. Ward-level antibiotic exposure varied from 21.7 to 56.4 days of therapy per 100 patient-days. From the above results, they concluded that among hospital inpatients, ward-level antibiotic prescribing is associated with a statistically significant and clinically relevant increase in C difficile risk that persists after adjustment for differences in patient-level antibiotic use and other patient- and ward-level risk factors.[12] Sandora et al described the epidemiology of paediatric CDI at a quaternary care hospital. They analyzed children less than 18 years tested for C. difficile between January and

August 2008. They observed that of 1891 tests performed, 263 (14%) were positive in 181 children. Ninety-five patients ≥ 1 year with CDI were compared with 238 controls. From the results, they concluded that diagnostic testing has less utility in patients being treated with C. difficile-active antibiotics.[13] Dulęba et al determined the extent of CDI among children hospitalized with diarrhea, risk factors or predictors for severe CDI, the prevalence of NAP1, and to compare the course of CDI depending on bacteria toxicity profile. From the results, they concluded that C. difficile is an important factor of antibiotic-associated diarrhoea in children.[14]

CONCLUSION

From the above results, the authors concluded that prior antibiotic exposure was found to be a risk factor, emphasizing the importance of antibiotic programs. Future studies in this field are advocated.

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