Research Article

Effect of probiotics in antibiotics associated diarrhea and gastric acid suppressants in secondary care pediatric hospital

R. Prakash, M. Varaprasanna Rao*

ABSTRACT

Aim and Objective: This study aims to determine the effects of probiotics in the treatment of antibiotic and gastric acid suppressants associated diarrhea. To estimate the reduction in the risk of antibiotic-associated diarrhea with the administration of probiotics and to identify factors associated with such reduction. **Materials and Methods:** Patients aged 4 months–13 years who have been receiving antibiotics of both genders are included in the study. The effects of probiotics in the treatment of antibiotics and gastric acid suppressants associated diarrhea were evaluated. This study has been carried out for the period of 6 months in PCMC the child care hospital, Pallavaram, Chennai. **Results and Discussion:** Eighty-six patients who had antibiotic and gastric acid suppressants associated diarrhea were included in this study and appropriate treatment was done with probiotics and antibiotics, and their frequency of diarrhea was evaluated for next 1 week. **Conclusions:** The appropriate data were obtained and evaluated based on that probiotic alone shows superior response than antibiotic group.

KEY WORDS: Antibiotic-associated diarrhea, Clostridium difficile infection, Probiotics, Symbiotic

INTRODUCTION

Antibiotic-associated diarrhea (AAD) is a common complication of most types of antibiotics, especially for broad-spectrum antibiotics such as clindamycin, beta-lactams, and third-generation cephalosporins. Rates of AAD vary from 5 to 39% depending on the type of antibiotic, age, health status of the host, and type of environment (hospitalization, extended care facilities, etc.).[1,2] AAD has been reported in a wide variety of populations including outpatients, hospitalized patients, and residents of long-term care facilities.[1] The clinical presentation of AAD may be mild (uncomplicated diarrhea) or more severe (colitis), or result in toxic megacolon or death.[3] Consequences of AAD may result in extended hospital stays, increased medical care costs, and increased diagnostic procedures.[3,4] Prevention of AAD has rested on discontinuing the inciting antibiotic or switching to an antibiotic with a narrower spectrum of action, but there are no other current effective preventive measures for AAD. Clostridium difficile infections (CDIs) continue to persist as a leading cause of nosocomial gastrointestinal (GI) illness.[5-7] The rates of CDI have been increasing globally over the years. Gastric acid suppressants will also reduce the acid secretion to avoid stomach and indigestion to the child results in poor microbial flora and diarrhea was induced. Although other investigational antibiotics are under development, no new antibiotics are superior to the two standard antibiotics. Probiotics are "live microorganisms, which when administered in adequate amounts, confer a health benefit on the host."[8] Probiotics are available as capsules of freeze-dried or lyophilized culture supernatants, dried power of heat-dried culture supernatants, and mixed in dairy foods (such as yogurts, cheese, milk, or ice cream) or other foods (kefir, chocolate, and wafers).[9-10] In contrast, a prebiotic is "a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the GI microflora that confers benefits upon host well-being and health."[11] Synergistic combinations of probiotics and prebiotics are called synbiotics.[12] The interest in probiotics as therapy has increased dramatically since 1999 and the frequency of peer-

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reviewed randomized clinical trials has kept pace with the global interest in this innovative method of therapy. Most trials have been in the field of acute pediatric diarrhea, but the frequency for antibiotic-associated trials has increased.[13]

Gastric acid suppressant medications, such as proton-pump inhibitors and H_2 receptor blockers, are commonly prescribed or obtained as over-the-counter products for gastroesophageal reflux disease, peptic ulcer disease, or functional dyspepsia, but they are also sometimes prescribed for unnecessary indications, which lead to overuse.[14-16] Probiotics offer several advantages and have few disadvantages as a therapeutic mode for AAD and CDI. Potential mechanisms of action may include: (1) Enhancing the natural barrier effect of normal intestinal microflora, (2) modulation of the immune system, (3) direct antimicrobial effects, and (4) regulation of intestinal enzymes and interactions with the enteric nervous system.[16-18] Newer techniques, including metagenomics and PCR probes, have documented that a typical human may carry over 40,000 bacterial species in the collective intestinal microbiome.[18]

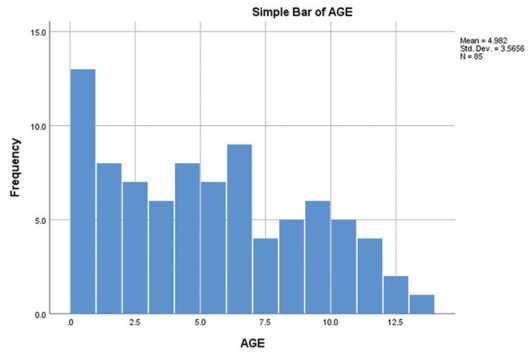
MATERIALS AND METHODS

An observational study technique was used to analyse the effect of probiotic , following the ethical guidelines mandated by the Institutional Review Board. The project protocol was approved by Ethics Committee, school of Pharmaceutical sciences, VISTAS, Chennai, Tamilnadu, India (IEC 2018/01). Paediatric patient and their parents/ guardians consulting the Pediatrician in PCMC Multispeciality Hospital. Were recruited for the study. The inclusion criteria in this study was Patients aged four months to thirteen years who has been receiving antibiotics of both gender Parents who sign informed consent forms to enroll in the study. We excluded the patient Infants < 4 months of age with febrile diarrhea and parents who refused to give consent, not willing to obtain stool test. The included sample size of 86 patients based on calculation ($P = 0.65$) for the study.

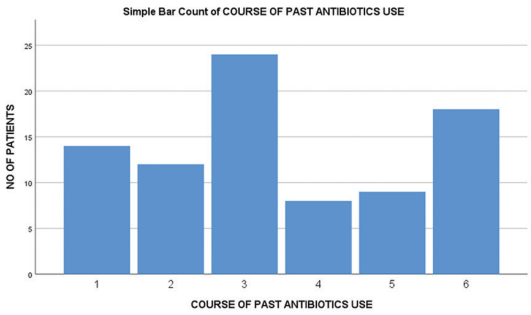
Statistical Analysis

The statistical analysis will be carried out using SPSS software. Percentages were calculated for categorical variables. Means and standard deviations were calculated for numerical variables. Continuous variables were compared using Student's *t*-test for normally distributed variables. The Chi-square test and Fisher's exact test were used to compare two groups. Chi-square test was used to assess the significance of the responses and $P < 0.05$ was considered statistically significant.

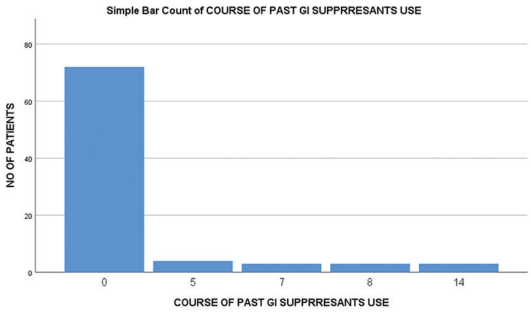
RESULTS



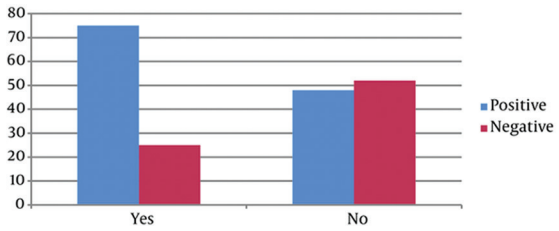
of 86 patients, the bar graph represents the age group of 43.2% they are receiving the frequency of drugs mostly in between the age group of 0 and 5 years who are receiving more drug due to poor complaints and poor assumption from the parents and with the minimal group 13.2% in above 12–15 years.



This graph shows that out of 86 patients 64.18% patients feeling diarrhea at the third day of the past antibiotic use.



The above graph shows that the past GI suppressants group was higher in the age group of between 0 and 5; this resembles with 79.5%.



Out of selected 86 patients after the course of antibiotic and probiotic usage, the clinical outcome was investigated from the parents major of 76% that they are saying positive outcome by the usage of probiotics and less positive feedback for antibiotics of 24%.

DISCUSSION

A total of 86 patients met inclusion criteria. The majority used *Lactobacillus*-based interventions alone or in combination with other genera; strains were poorly documented, indicated a statistically significant association of probiotic administration with reduction in AAD; this result was relatively insensitive to numerous subgroup analyses. However, there exists significant heterogeneity in pooled results and the evidence is insufficient to determine whether this association varies systematically by population, antibiotic characteristic, or probiotic preparation.

Gastric acid suppression has been implicated in the pathogenesis of both primary and recurrent CDI due to loss of the protective effect of gastric acid and/or perturbations in the gut microbiota. Studies demonstrating the association between gastric acid suppressants and recurrent CDI have shown conflicting results.

In this study, we say that the age group of 0–5 years who has been receiving more frequent of GI suppressants due to poor compliance and with 79.5%.

Probiotics are microorganisms intended to have a health benefit when consumed. Synbiotics refer to preparations, in which probiotic organisms and prebiotics (non-digestible food ingredients that may benefit the host by selectively stimulating bacteria in the colon) are combined. Potentially, probiotics maintain or restore gut microecology during or after antibiotic treatment through receptor competition, competition for nutrients, inhibition of epithelial and mucosal adherence of pathogens, introduction of lower colonic pH favoring the growth of nonpathogenic species, stimulation of immunity, or production of antimicrobial substances. There is an increasing interest in probiotic interventions, and evidence for the effectiveness of probiotics in preventing or treating AAD is also increasing. The previous reviews have been non-systematic, have focused on specific patient populations or probiotic genera, and have not included the latest clinical trials. A 2006 meta-analysis on probiotic use for AAD included 25 randomized controlled trials (RCTs) and a 2006 review included 16 relevant RCTs. Both studies suggested that probiotic use was associated with reduced risk of AAD. Yet, more than 30 additional RCTs on the topic have been to published. A recent Cochrane review on pediatric AAD suggested a protective association of probiotic use in preventing AAD in children. Most studies of probiotics include adult participants, which suggests the evidence in adult AAD prevention should also be revisited.[11]

The objective of this study is to evaluate broadly the available evidence on probiotics and symbiotic interventions including the genera *Lactobacillus*, *Bifidobacterium*, *Saccharomyces*, *Streptococcus*, *Enterococcus*, and *Bacillus*, alone or in combination, for the prevention or treatment of AAD.

CONCLUSIONS

The pooled evidence suggests that probiotics are associated with the treatment of reduction in AAD. More research is needed to determine which probiotics are associated with the greatest efficacy and for which patients receiving which specific antibiotics. The use of antibiotics that disturb the GI flora is associated with clinical symptoms such as diarrhea, which occurs in as many as 30% of patients. Symptoms range from mild and self-limiting to severe, particularly in CDI, and AAD is an important reason for non-adherence with antibiotic treatment (AD).

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