

Recent Emerging Gut Microbiome Management Modalities in Acute Diarrhea in Children: (A Comparative Study Review of Different Probiotic Strains)..An Update!

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ABSTRACT

Acute Diarrhea (AD) is a highly prevalent condition that causes significant morbidity and mortality worldwide. Conventional therapies include Oral Rehydration Solutions (ORS), Antibiotics, and Zinc Products. Emerging data suggest that Probiotics use in the treatment and control of AD cases in children may help supplement current therapies for further control. Herein, we review the evidence of several Probiotics modalities for AD treatment. We describe the Clinical Impact and prevalence of Acute Diarrhea in children and its complications, provide an overview of current treatments, and finally, discuss recent emergent Gut approaches to AD management. Specifically, we will describe in a Comparative study on the utility of different kinds of Probiotics known and used and common natural products in the treatment of Acute cases of AD and focus on recent, high-quality studies. Adverse effects and potential interactions of each therapy will be highlighted where applicable.

Keywords:

Probiotic strains, A. Diarrhea, Intestinal colonization, GUT Microbiome, Dehydration, LrGG

Introduction

Acute Diarrheal Diseases are considered the most common leading causes of child mortality all over the globe. Today, only 39 percent of children with Diarrhea in developing countries receive the recommended treatment, and limited trend data suggest that there has been little progress since 2000, more than 386000 children die in India only due to Diarrhea every year.

An international commitment to tackle childhood Diarrhea in the 1970s and 1980s resulted in a major reduction in child deaths. This came about largely through the scaling up of oral rehydration therapy, coupled with programs to educate caregivers on its appropriate use. But these efforts lost momentum as the world turned its attention to other global emergencies.

Our review aims to search and updates the Evidence-Based Review Articles that study the use of specific probiotic strains, namely *Lactobacillus rhamnosus* GG (LGG) and *Saccharomyces boulardii*, for the management of children with *Acute Gastroenteritis* (AGE) as an adjunct to rehydration therapy.

This Literature Review also aims to show us the role of different probiotics in the treatment of acute diarrhea in children [1-8]

“Probiotics may be an effective adjunct to the management of diarrhea”

Lactobacillus rhamnosus GG (LGG) significantly reduced the duration of Diarrhea, daily stool outputs, improved stool consistency, and reduced no of hospitalization and fever in children compared to other probiotics (*B. clausii* and *S. boulardii*) and ORS group as we will discuss now.

The guidelines recommend the use of the specific probiotic strains, namely *Lactobacillus rhamnosus* GG (LGG) and *Saccharomyces boulardii*, for the management of children with *Acute Gastroenteritis* (AGE) as an adjunct to rehydration therapy [9-12].

Discussion

The Efficacy of any probiotic is strain-dependent

1. *Lactobacillus acidophilus* strain is effective in IBS but not in AAD.
2. *Bifidobacterium bifidum* reported that one strain (CIDCA5310) inhibited enterocyte invasion by *Salmonella arizonae*, whereas the other (CIDCA 537) had no effect.
3. *Lactobacillus rhamnosus* GG help in the treatment of Acute Diarrhea, Persistent diarrhea, Rotavirus diarrhea, Gastroenteritis, AAD (Antibiotic-Associated Diarrhea) Prevention and Treatment, Traveller's Diarrhea, Nosocomial Diarrhea, Irritable Bowel Syndrome (IBS), Abdominal pain, Crying, etc. Ulcerative colitis, Necrotizing Enterocolitis (NEC) in pre-term infants, As an adjuvant to vaccines to stimulate immunity, Gastrointestinal infections, and Respiratory infections.
4. *L. Rhamnosus* GG age group help in the treatment of acute

infectious Diarrhea, Antibiotic-Associated Diarrhea (AAD), Nosocomial Diarrhea, Acute Gastroenteritis (AGE), Irritable Bowel Syndrome (IBS), Preventing infections, Allergic diseases, *C. difficile* Diarrhea Pouchitis, Adjuvant therapy for *H. pylori* Eradication [13-16].

Proved Advantages and Clinical Benefits of LGG Probiotic Strains Use:

1. *Lactobacillus rhamnosus* GG (ATCC 53103) has a safe history of use since 1990.
2. Can even be given to a 24 hrs old neonate..!
3. Clinically studied in various age group population starting from newborn preterm infants to the elderly population.
4. Clinically studied at various dosage range starting (120 mn CFU to 2000 bn CFU/d) [17-18].

Do probiotics work in Acute Infectious Diarrhea?

That study concluded that:

1. Its use reduced the duration of Diarrhea by around 25 hours.
2. The risk of Diarrhea is >4 days by 59%.
3. One fewer diarrheal stool on day 2 after the intervention [19].

Comparative clinical study; *L. rhamnosus* GG vs. *B. clausii* vs. *S. boulardii*

Study design

This study designed to compare the efficacy of 5 different preparations recommended to parents in the treatment of acute Diarrhea in children.

1. Design: Prospective randomized controlled clinical trial.
2. Study Arm: N=571 children (age 3-36 months).
3. Duration: 5 days [20].

The study concludes the use of LrGG P. Strains;

Reduce in the duration of diarrhea:

- LrGG group has shown the highest and significant efficacy in terms of reducing the duration of Diarrhea compared to other probiotics and ORS group

Reduce in daily stool outputs:

- LrGG group has shown a significant reduction in terms of number of stools per day on Day-2 compared to other probiotics and ORS group

Improve in stool consistency:

- LrGG group has shown significant improvement in terms of stool consistency on Day-2 compared to other probiotics and ORS group

Recent Content Analysis Report of Various Probiotic Brands

Comparative Study of 3 Brands between Enterogermina vs. Tufpro vs. Darolac Aqua [21].

That comparative review stated only product 1 was found to contain a homogenous population of *Bacillus clausii* whereas product 2 and product 3 showed growth of *Bacillus subtilis* species in the samples.

Conclusion

Our mini-review aims to use of the specific probiotic strains,

namely *Lactobacillus rhamnosus* GG (LGG) and *Saccharomyces boulardii*, for the management of children with Acute Gastroenteritis (AGE) as an adjunct to rehydration therapy.

The aim of this mini-Review also is to show us the role of probiotics in the treatment of acute Diarrhea in children. We review the evidence of several Probiotics modalities for AD treatment. We describe the Clinical Impact and prevalence of Acute Diarrhea in children and its complications, provide an overview of current treatments, and finally, discuss recent emergent Gut approaches to AD management. Specifically, we will describe in a Comparative study on the utility of different kinds of Probiotics known and used and common natural products in the treatment of Acute cases of AD and focus on recent, high-quality studies. Adverse effects and potential interactions of each therapy will be highlighted where applicable.

Some probiotics agents have a beneficiary effect on the onset, course of acute Diarrheal illnesses but still in need of further reviews on the side effects and safety of such agents.

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