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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

Aims & Objectives: 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 & control of AD cases in children may help supplement current therapies for further control.

Methods: We review the evidence of several Probiotics modalities for AD treatment. We describe the Clinical Impact & 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 & 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 considered as the most common leading causes of children mortality all over the globe. Today, only 39 per cent 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 dies in India only due to A. 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 & 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 [1-10].

This Literature Review also aim to show us the role of different probiotics in the treatment of acute diarrhea in children.

"Probiotics may be an effective adjunct to the management of diarrhea".

L. rhamnosus GG (LGG) significantly reduced 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) & 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.

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 (ATCC) help in treatment of Acute diarrhea, Persistent diarrhea, Rotavirus diarrhea, Gastroenteritis, AAD (Antibiotic Associated Diarrhea) Prevention & 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 & Respiratory Infections.
4. L. Rhamnosus GG – Age group help in 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 [11-16].

Proved advantages & clinical benefits of lGG probiotic strains use

- Lactobacillus rhamnosus GG (ATCC 53103) has a safe history of use in since1990
- Can even be given to a 24 hrs old neonate..!
- Clinically studied in various age group population starting from new born preterm infants to elderly population
- Clinically studied at various dosage range starting (120mn CFU to 2000bn CFU/d)

Do probiotics work in acute infectious diarrhea?

63 trial, 8014 subjects

That study concluded that:

- Its use reduced the duration of diarrhea by around 25 hours,
- Risk of diarrhea be > 4 days by 59%,

- & One fewer diarrheal stool on day 2 after the intervention.

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

BMJ RESEARCH

Probiotics for treatment of acute diarrhoea in children: randomised clinical trial of five different preparations

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Group	Treatment	Dosage (twice daily)
1	Control: Oral rehydration solution (ORS) (N=92)	-
2	Saccharomyces boulardii (N=91)	5 billion CFU/dose
3	Bacillus clausii (N=100)	1 billion CFU/dose
4	Enterococcus faecium (N=91)	0.075 CFU/dose
5	Lactobacillus rhamnosus GG (ATCC 53103) (N=100) (uncoated)	6 billion CFU/dose

RESEARCH LETTER

TABLE I CONTENT ANALYSIS OF THREE COMMERCIALLY AVAILABLE PROBIOTIC PREPARATIONS CONTAINING *BACILLUS CLAUSII*

Parameter	*Product 1*	*Product 2*	*Product 3*
Species on label	*Bacillus clausii*	*Bacillus clausii*	*Bacillus clausii*
Isolated species	*Bacillus clausii*	*Bacillus subtilis*	*Bacillus subtilis*
Label count	2×10^9	2×10^9	2×10^9
Isolated species count			
Batch 1	1×10^9	4×10^6	5×10^9
Batch 2	2.5×10^8	2.5×10^6	2×10^8
Batch 3	1×10^9	1.6×10^6	7×10^8
Batch 4	2×10^9	3.4×10^6	1.3×10^8

Product 2 (Tufpro – Expiry range: 01/18 – 08/18) and Product 3 (Darolac Aqua – Expiry range: 12/17 – 09/18). The expiry date of products as mentioned by manufacturer was two years for all three products. MALDI-TOF-MS identification method (Matrix Assisted Laser Desorption Ionization Method Time of Flight– Mass Spectrometry) was used to identify bacterial species. Plate count method was used and colonies were counted as Colony Forming Units (CFU)/sample using Miles and Mishra method [2,3].

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. None of the samples had uniform viable bacterial counts across all samples as mentioned on the labels (*Table* I).

Our results are in agreement with some of the

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REFERENCES

1. Hill C, Guarner F, Reid G, Gibson GR, Merenstein DJ, Pot B, *et al*. The International Scientific Association for Probiotics and Prebiotics Consensus Statement on the Scope and Appropriate Use of the Term Probiotic. Nat Rev Gastroenterol Hepatol. 2014;11:506-14.
2. Miles AA, Mishra SS, Irvin JO. The estimation of bactericidal power of the blood. J Hyg (Lond). 1938;38:732-49.
3. Hedges AJ. Estimating the precision of serial dilutions and viable bacterial counts. Int J Food Microbiol. 2002;76:207-14.

- Study Arm: N=571 children (age 3-36 months).
- Duration: 5 days.

Study design

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

- Design: Prospective randomized controlled clinical trial.

That study concluded that … The use of LrGG P. Strains;

Reduce in duration of diarrhea: LrGG group has shown highest & significant efficacy in terms of reducing duration of diarrhea compared to other probiotics & ORS group.

Reduce in daily stool outputs: LrGG group has shown significant reduction in terms of no. of stools per day on Day-2 compared to other probiotics & ORS group.

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

Recent Content Analysis Report of Various Probiotic Brands

Comparative Study of 3 Brands … *Enterogermina* vs. *Tufpro* vs. *Darolac Aqua*; These figure that show us the study [17-21];

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 subiilis species in the samples.

Conclusions

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 [2]. The aim of this Mini Review also is to show us the role of probiotic in the treatment of acute diarrhea in children. We review the evidence of several Probiotics modalities for AD treatment. We describe the Clinical Impact & 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 & 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 Benifitiary effects on the onset, course of acute Diarrheal illnesses but still in need for further reviews on the side effects & safety of such agents.

References

1. Radlović N. Acute Diarrhea in Children./Radlović N, Leković Z, Vuletić B, Radlović V, Simić D. Srp Arh Celok Lek. 2015; 143: 755-762.
2. Mokomane M, Kasvosve I, Melo ED, Pernica JM, Goldfarb DM. The global problem of childhood diarrhoeal diseases: emerging strategies in prevention and management. Ther Adv Infect Dis. 2018; 5: 29-43.
3. Wielgos K, Setkowicz W, Pasternak G, Lewandowicz-Uszynska A. Postepowanie w ostrej biegunce infekcyjnej u dzieci. Pol Merkur Lekarski. 2019; 47: 76-79.
4. Pavlinac PB, Brander RL, Atlas HE, John-Stewart GC, Denno DM, Walson JL. Interventions to reduce post-acute consequences of diarrheal disease in children: a systematic review. BMC Public Health. 2018; 18: 208.
5. Florez ID, Veroniki AA, Al Khalifah R, Yepes-Nuñez JJ, Sierra JM, Vernooij RW, et al. Comparative effectiveness and safety of interventions for acute diarrhea and gastroenteritis in children: A systematic review and network meta-analysis. PLoS One. 2018; 13: e0207701.
6. Szajewska H, Konarska Z, Kołodziej M. Probiotic bacterial and fungal strains: claims with evidence. Digestive diseases. 2016; 34: 251-259.
7. Halloran K, Underwood MA. Probiotic mechanisms of action. Early human development. 2019; 135: 58-65.
8. Islam SU. Clinical uses of probiotics. Medicine. 2016; 95.
9. Hojsak I. Probiotics in children: what is the evidence?. Pediatr Gastroenterol Hepatol Nutr. 2017; 20: 139-146.
10. Vandenplas Y. Probiotics and prebiotics in infectious gastroenteritis. Best Pract Res Clin Gastroenterol. 2016; 30: 49-53.
11. Guarino A, Guandalini S, Vecchio AL. Probiotics for prevention and treatment of diarrhea. J Clin Gastroenterol. 2015; 49: 37-45.
12. Barnes D, Yeh AM. Bugs and guts: practical applications of probiotics for gastrointestinal disorders in children. Nutr Clin Pract. 2015; 30: 747-759.
13. Wilkins T, Sequoia J. Probiotics for gastrointestinal conditions: a summary of the evidence. Am Fam Physician. 2017; 96: 170-178.
14. Pace F, Pace M, Quartarone G. Probiotics in digestive diseases: focus on Lactobacillus GG. Minerva Gastroenterol Dietol. 2015; 61: 273-292.
15. Perceval C, Szajewska H, Indrio F, Weizman Z, Vandenplas Y. Prophylactic use of probiotics for gastrointestinal disorders in children. Lancet Child Adolesc Health. 2019; 3: 655-662.
16. Pomar B. Role of prebiotics and probiotics in the functionality of the microbiota in the patients receiving enteral nutrition. Nutr Hosp. 2018; 35: 18-26.
17. Szajewska H, Kołodziej M. Systematic review with meta-analysis: Lactobacillus rhamnosus GG in the prevention of antibiotic-associated diarrhoea in children and adults. Aliment Pharmacol Ther. 2019; 49: 1376-1384.
18. Li YT, Xu H, Ye JZ, Wu WR, Shi D, Fang DQ, et al. Efficacy of Lactobacillus rhamnosus GG in treatment of acute pediatric diarrhea: A systematic review with meta-analysis. World J Gastroenterol. 2019; 25: 4999-5016.
19. Allen SJ, Martinez EG, Gregorio GV, Dans LF. Probiotics for treating acute infectious diarrhoea. Cochrane Database of Systematic Reviews. 2010.
20. Canani RB, Cirillo P, Terrin G, Cesarano L, Spagnuolo MI, De Vincenzo A, Albano F, Passariello A, De Marco G, Manguso F, Guarino A. Probiotics for treatment of acute diarrhoea in children: randomised clinical trial of five different preparations. BMJ. 2018.

21. Yadav P, Sharma P, Arora R. Recent content analysis report of various probiotic brands: (Comparative Study of 3 Brands … *Enterogermina vs. Tufpro vs. Darolac Aqua*). Indian Pediatrics J. 2018.