Original Research Article

Role of Saccharomyces boulardii in management of acute diarrhoea of children - A randomized controlled trial

Gajanan M Sirsat[1*], D M Sankpal[2]

[1]Sr. Resident, [2]Associate Professor, Department Of Pediatrics, Post Graduate Institute of Pediatrics and Research centre, Satara, Maharashtra, INDIA.
Email: gajanansirsat@yahoo.com

Abstract

Background: Although oral rehydration solution remains the mainstay in the treatment of acute diarrhoea, this therapy does not reduce the duration of diarrhoea, prompting a growing interest in adjunctive treatments. The present study demonstrated that oral treatment with S.boulardii diminished the duration of diarrhoea from the second day after the beginning of the intervention as compared with a control group. **Objective:** To assess effects of Saccharomyces boulardii in acute diarrhoea. in terms of reduce duration and severity of diarrhoea. with use of Saccharomyces boulardii in dosage of 50 mg/kg/ day in two divided doses daily for five days in acute childhood diarrhoea. **Material and Methods:** This was a prospective randomized control trial study that was conducted in with strength of 290 cases, aged 2 months to 5 years from both sex, presenting with acute watery diarrhoea at Niramay hospital and research centre, Satara, were enrolled in the study. Informed consent was taken from the parents before enrolment. Information was collected in the form of questionnaire that included age, sex, anthropometric data and systemic details. The study population was randomly divided into 2 groups using random numbers table with 145 children in each group. Degree of dehydration of study population was assessed by who guidelines, including general condition, eagerness to drink, sunken eyes and skin turgor. Children were categorized as having mild dehydration, moderate dehydration and severe dehydration. This randomized controlled trial was conducted at Niramay hospital and research centre, Satara for 1 year duraration. Non-probability, purposive sampling was employed as sampling technique. **Results:** Probiotic Saccharomyces boulardii administration as add-on medication reduced the duration of illness after approximately 24 hours shows significant difference in our study favouring the use of probiotic S accharomyces in treatment group as compared to the control group. Saccharomyces boulardii shortens the duration of diarrhea, normalizes stool consistency, reduces the frequency of diarrhoea,the effect was more significant from 3rd day onwards. The appearance of the 1st semiformed stool was earlier after giving Saccharomyces boulardii. The mean number of stools per day were significantly reduced after administration of Saccharomyces boulardii. The results were obvious from 2nd day onwards. **Conclusion:** The use of S. boulardii along with rehydration therapy main stay of treatment in diarrheal diseases in children.So its use should be encouraged in order to reduce both mortality and morbidity in diarrhea illness.

Key Words: Acute diarrhea, Saccharomyces boulardii, Probiotics, Degree dehydration, Rehydration therapy.

[*]**Address for Correspondence:**
Dr. Gajanan M. Sirsat, Jai Gajanan Children Superspeciality Hospital, Ghatpuri Naka, Khamgaon Dist –Buldhana, Maharashtra, INDIA.
Email: gajanansirsat@yahoo.com
Received Date: 20/10/2017 Revised Date: 09/11/2017 Accepted Date: 23/12/2017
DOI: https://doi.org/10.26611/1012434

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 26 December 2017

INTRODUCTION

Diarrheal diseases in children is the second most common leading cause of under 5 mortality accounting for about 18% over worldwide. The disease causes more than 2.5 billion episodes of illness and 1.5 million annual deaths globally. Most of these deaths occur in developing countries. According to United Nation report more children under 5 years died in India than anywhere else in world in 2011, that is 1.7 million children[1]. The role of saccharomyces boulardii as a probiotics in diarrhoea

How to cite this article: Gajanan M Sirsat, D M Sankpal. Role of Saccharomyces boulardii in management of acute diarrhoea of children - A randomized controlled trial. *MedPulse International Journal of Pediatrics.* December 2017; 4(3): 68-72.
http://medpulse.in/Pediatrics/index.php

depends on many factors including intrinsic property of a yeast, its pharmacokinetics, product to product variation, stability, number of strain used in probiotic preparation and dose of probiotic use. Probiotics have moderate clinical benefits in the treatment of acute diarrhoea in children, the result should be interpreted with caution because of methodological limitation of the studies and that more research is needed. An increasing number of potential health benefits are being attributed to probiotics treatment. However, only a limited number have been confirmed in well designed and conducted randomized controlled trials (RCTs) and even less in the paediatrics population. Saccharomyces boulardii is a live yeast used extensively as a probiotics and often marketed as a dietary supplement. An increasing number of potential health benefits are being attributed to the use of Saccharomyces boulardii in acute diarrhoea in children, however, limited numbers have been confirmed in a well designed and conducted randomized controlled trials. The role of saccharomyces boulardii in treatment of acute diarrhoea has received considerable attention in recent year. so this study aim at the efficacy of saccharomyces boulardii in acute diarrhea.

MATERIAL AND METHOD

This was a prospective randomized control trial study that was conducted in with strength of 290 cases, aged 2 months to 5 years from both sex, presenting with acute watery diarrhoea at POST GRADUATE INSTITUTE OF PEDIATRIC and NIRAMAY HOSPITAL RESEARCH CENTRE, SATARA, were enrolled in the study. Informed consent was taken from the parents before enrolment. Information was collected in the form of questionnaire that included age, sex, anthropometric data and systemic details. The study population was randomly divided into 2 groups using random numbers table with 145 children in each group. Degree of dehydration of study population was assessed by WHO guidelines, including general condition, eagerness to drink, sunken eyes and skin turgor. Children were categorized as having mild dehydration, moderate dehydration and severe dehydration. A written approval was taken from guardians of the patients before conducting the study.

Methodology: The study population in Probiotic group was managed by ORS and orally administered S. boulardii (250 mg BD) diluted in water or mixed with semi-solid food. In our study dose of Saccharomyces used- 50 mg/kg/day. The control group children were managed by ORS alone. The active treatment period was 5 days. All study participants were examined on day 1 and were monitored for next 5 days. Efficacy was assessed by improved consistency of stools (formed stools) and decrease in duration of diarrhoea and reduced frequency of stools less than 3 per 24 hours. All children completed the stipulated 5-day study period and no one was lost to follow up. The relevant tests of significance such as "chi square test" were applied for qualitative variables (dehydration status, vomiting and frequency and consistency of stool) and quantitative variables (age, weight and duration of diarrhoea) respectively. A p value of <0.05 or <0.001 was considered as significant depending on the data analyzed.

RESULTS

In our study the stool consistency were comparable in both groups on day 1.However stool consistency- formed stool significantly was noted in probiotic group on day 3 (56.5%) comparable with control group (37.4%). Thus improvement was significantly rapid in the probiotic compared with control group.

Table 1: Comparison on basis of stool consistency-formed stool in between 2 group

Stool Consistency (Days)	Formed Stool	
	Probiotic	Control
1	5 (3.5%)	1 (0.7%)
2	40 (27.5%)	31 (21.4%)
3	82 (56.5%)	54 (37.4%)
4	108 (74.5%)	95 (65.5%)
5	145 (100%)	145 (100%)

X^2 test=41.39, DF =4, P value < 0.001 (Singnificant) Since p value is less than 0.001, it proves that difference is statistically significant

The stool frequency were comparable in both groups on day 1 and 2. However decrease in frequency significantly was noted in probiotic group on day 3 (43%) comparable with control group (23%). Thus improvement was significantly rapid in the probiotic compared with control group.

Table 2: Comparison on basis of stool frequency (< 3 stools per day) in both groups

Frequency (In Days)	< 3 Stools/Day	
	Probiotic	Control
1	3(2%)	2(1.5%)
2	31(22%)	36(25.5%)
3	63(43%)	34(23%)
4	25(17%)	26(18%)
5	23(16%)	47(32%)
Total	**145(100%)**	**145(100%)**

X^2 test= 38.2, DF=4, P value<0.001(significant) Since p value is less than 0.001, it proves that difference is statistically significant.

It can is clear that the mean duration of diarrhoea less than or equal to 3 days of intervention seen in probiotic group (67%) as compared to control group (49%).Thus overall response to probiotic on decreasing frequency stool on 3 day of intervention shows significant difference.

Table 3: Mean duration of diarrhoea after intervention in both groups

Group	Mean Duration Of Diarrhoea After Intervention In Both Group		Total
	≤ 3days	>3days	
Probiotic	97(67%)	48(33%)	145
Control	72(49%)	73(51%)	145
Total	**169**	**121**	**290**

X^2 test = 17.242, DF=1, P value < 0.01(Significant) Since p value is less than 0.01, it proves that difference is statistically significant.

It can be observed that the appearance of first semiformed stool in probiotic group is somewhat earlier (38%) as compared to control group(26%).Thus, it shows that there is significant improvement in stool consistency – semiformed stool in probiotic group than in control group.

Table 4: Comparison on basis of appearance of 1st semiformed stool in probiotic and control group

Group	Appearance Of 1st Semiformed Stool		Total
	Before 3rd Day	On Or After 3rd Day	
Probiotic	55(38%)	90(62%)	145
Control	37(26%)	108(74%)	145
Total	**92**	**198**	**290**

X^2 test =11.7,DF=1,P value <0.001(Significant) Since p value is less than 0.001, it proves that difference is statistically significant

There is difference between children rotavirus antigen test positive having decrease diarrhea frequency in probiotic and control group. About 64% in probiotic group as compared with 39% control group having decreased diarrhoea after 3 days of intervention.

Table 5: Comparison on basis of rota virus antigen positive having decrease frequency of diarrhoea after 3 days of intervention

Group	Reduced Frequency Of Diarrhoea After 3rd Day Of Intervention		Total
	Yes	No	
Probiotic	28(36%)	60(64%)	88
Control	47(61%)	30(39%)	77
Total	**75**	**90**	**165**

X^2 test=14.14, DF=1,P value <0.001(Significant) The p value is less than 0.001 which is statistically significant.

It is shown that there is significant difference in the probiotic and control group in reducing diarrhoea frequency in probiotic group (71%) as comparable to control group (47%) in patients with lactose intolerance on 5th day of intervention.

Table 6: Comparison between lactose intolerance patients having decrease frequency of diarrhea after 5 days of intervention

Group	Lactose Intolerance Patients Having Decrease Frequency Of Diarrhoea After 5 Days Of Intervention		Total
	YES	No	
Probiotic	27(71%)	11(29%)	38
Control	14(47%)	16(53%)	27
Total	**41**	**27**	**68**

X^2 test =4.16, DF=1, P value <0.05(Significant) Since p value is less than 0.05, it proves that difference is statistically significant.

It is shown that there is significant difference in the probiotic and control group in reducing diarrhoea frequency in probiotic group (62%) as comparable to control group (45%) having required hospitalisation less than 3 days.

Table 7: Comparison on basis of median days of hospitalisation required in both groups

Group	Hospitalisation (Days)		Total
	<3 DAYS	>3 DAYS	
Probiotic	90(62%)	55(38%)	145
Control	65(45%)	80(55%)	145
Total	**155**	**135**	**290**

X^2 test =17.4, DF=1, P value<0.001(Significant) Since p value is less than 0.001, it proves that difference is statistically significant.

DISCUSSION

There are numerous randomized, double blind placebo controlled studies showing the efficacy of Saccharomyces Boulardii in treatment and prevention of many gastrointestinal disorders. The consistency of stool i.e. time from start of treatment until the appearance of first normal formed stool was an important outcome. A randomized controlled trial was conducted by Htwe and colleagues *et al* 2008[2] in children with AWD. The children received ORS with and without S. boulardii (50 mg/kg/day, twice daily) for 5 days. Stool consistency showed no difference between the two groups on day 2. But on day 3, it returned to normal in 76% of active treatment group versus 24% of control group. Another study done on Clinical Efficacy of Use of Probiotic "Saccharomyces Boulardii" A study done in Children with Acute Watery Diarrhoea Atiya khan *et al*, showed that there is no significant difference on first two days of intervention but on 3 rd there was markedly increase in number of patients in probiotic group (48%) as compared with control group(21%) showing change in stool consistency. In our study, the appearance 1st semiformed stool in probiotic group on 3rd day was 56.5% as comparable with control group 37.4%.The results were much better on 4th day. The overall assessment of clinical response showed are markable reduction in mean duration of diarrhoea as a result of appearance of formed stool in S. boulardii group compared to control group. On basis of clinical trial and Study done by Atiya khan and colleagues[3] the results regarding stool frequency on 3rd day, 54% children of the treatment group were observed passing less than 3 stools per day as compared to 30% in control group.

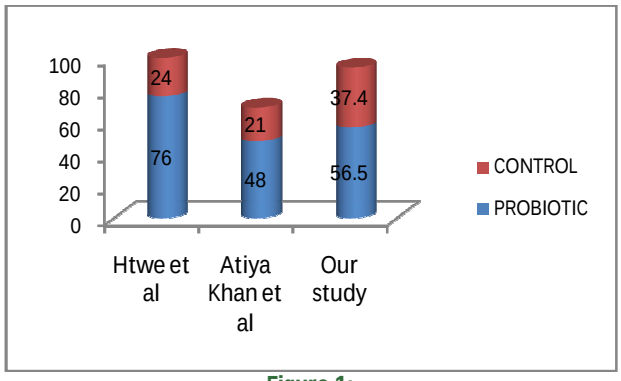

Figure 1:

Comparison between the studies for stool consistency-formed stool in between the probiotic and control groups. Another double blind, placebo controlled study conducted by Naflesia B,O., Correa *et al*.[4] It showed that that 2 days after the beginning of the intervention, the frequency of patients who remained with diarrhoea was lower in the probiotic group when compared with the placebo group. The difference between the 2 groups was maintained by day 3 of intervention, with 50% of patients with diarrhoea in the group treated with S boulardii and 32% in the placebo group. In our study stool frequency decreased from 2nd day onwards, it was significantly reduced on 3 rd day. Stool frequency on 3rd day 43% as comparable to control group it is 23%. it clearly shows that probiotic group had significant improvement as compared to control group. The mean duration of diarrhoea less than or equal to 3 days in Probiotic group was 67% whereas it is compared with that of control group 49%.This signifies that there is significant decrease in duration of diarrhoea in terms of decrease in frequency less than 3 stools per day and time from start of treatment until appearance of first normal stool. In 2007, Szajewska and colleagues conducted a meta-analysis study[5] in children with acute diarrhoea, comparing S.boulardii to placebo or no intervention. The combined data from these studies provide pool weighted mean difference of reduction of approximately 1 days in favour of treatment group. These results clearly correlate with our study. Similar beneficial effect of reduction in duration of diarrhoea by a little more than one day was seen in children treated with S. boulardii by Guandalini *et al*[6]. Another study Vandeplas *et al*[7] also showed a decrease in mean duration of diarrhoea by 1.3 days in S. boulardii group compared to control groups in children with acute diarrhoea. Another study conducted in Turkey showed the duration of diarrhoea as significantly reduced (more than one day) in S. boulardii Group compared with placebo Probiotic group in children having acute diarrhoea [Kurugol Z, Koturoglu G. *et al* 2005][8] The randomised control trial study done by Atiya Khan, Tahir Javed *et al*[3] showed that the mean duration of diarrhoea in Probiotic group was 3.43 days, compared with 4.50 days in the Control group. The Probiotic group (S. boulardii) had shown reduction in the duration of diarrhoea by approximately 1.1 day in children with acute watery diarrhoea. A randomized controlled trial was conducted by Htwe and colleagues[2] in children with AWD. The children received ORS with and without S.boulardii, (250 mg twice daily) for 5 days. The mean duration of diarrhoea was 3.08 days in S. Boulardii group as compared to 4.68 day of control. In one randomized control trial conducted by Naflesia B.O. Corre^a, _Francisco J[9]. when the children pertaining to the 2 types of intervention were separated into rotavirus positive patients and rotavirus negative patients, the beneficial effect resulting from probiotic treatment was observed essentially for patients presenting with rota negative cases with 29%of children who remained with diarrhoea in the group treated with S boulardii and 64% in the placebo group. In patients with rotavirus positive cases, 41.2% of children treated with S boulardii remained with diarrhoea, whereas in the placebo group, this frequency was 54.3% (Naflesia B.O. Corre^a, Francisco J.)[9] In our study There is difference between children rotavirus antigen test positive having decrease diarrhea frequency in probiotic and control group. About 64% in probiotic group as compared with 39% control group having decreased diarrhoea after 3days of intervention. The assumption was that the presence of lactase producing bacteria in the yogurt, especially Lactobacillus acidophilus, contributed to the digestion and absorption of lactose(Levri km, ketvertis k, deramo m)[10]. It was also found that the presence of Lactobacillus bulgaricus and Streptococcus thermophilus, Saccharomces boulardii alleviate lactose intolerance through their ability to produce lactase enzyme (McDonough FE, Hitchins AD)[11]Based on the mentioned data, it is clear that there is obvious role of saccharomyces boulardii in treatment of lactose intolerance. In our study, it is shown that there is significant difference in the probiotic and control group in reducing diarrhoea frequency in probiotic group (62%) as comparable to control group (45%) having hospitalisation required less than 3 days. In 2007, Szajewska, Graff S. and colleagues conducted a meta-analysis of the results from five studies comparing S. boulardii to placebo or no intervention[12]. A total of 619 children were enrolled in these trials, with S. boulardii doses of 250 to 600 mg/day or placebo given for 4 to 6 days. Four studies along with this included the duration of diarrhoea as an outcome, with all demonstrating a significant reduction with treatment and hospital stay. Single studies used in this analysis also documented a reduction in the risk of diarrhoea lasting more than 7 days, as well as a reduction in length of hospital stay.

CONCLUSION

We conclude that concurrent therapeutic use of S. boulardii showed that

1. Saccharomyces boulardii shortens the duration of diarrhea, normalizes stool consistency. The appearance of the 1st semiformed stool was earlier after giving Saccharomyces boulardii.
2. Saccharomyces boulardii reduces the frequency of diarrhoea, the effect was more significant from 3rd day onwards.The mean number of stools per day were significantly reduced after administration of Saccharomyces boulardii. The results were obvious from 2nd day onwards.
3. The benefit of Saccharomyces boulardii was more in terms of controlling frequency and duration of diarrhoea in rotavirus antigen positive group. The result of Saccharomyces boulardii was more significant in patients having lactose intolerance. Patients having lactose intolerance were having reduced frequency of diarrhoea earlier than the control group.
4. The main advantage of Saccharomyces boulardii was it reduces the median days of hospitalisation by reducing frequency and duration of diarrhoea.

RECOMMENDATIONS

In our study, S. boulardii shows key role in management of diarrhea. It safe and effacious way to manage diarrhea with probiotics.Thus Probiotics should used as far as possible in community health sector, these measures definitely will reduce mortality and morbidity resulting from diarrhea diseases.

REFERANCES

1. Bhutta ZA. Acute Gastroenteritis in Children. In: Kaliegman RM, Stanton BF, Geme JW,Schor NF,Behrman RE, editors. Nelsontextbook of pediatrics.19thPhiladelphia:WB Saunders Company; 2011:
2. Htwe K, Yee KS, Tin M, et al. Effect of Saccharomyces boulardii in the treatment of acute watery diarrhea in Myanmar children: a randomized controlled study. Am J Trop Med Hyg 2008;78:214–6
3. Atiya khan, Tahir javed, Akmal laeeq Chishti in king edward medical university, Lahore
4. Buts, 2009; Dahan et al. 2003; Mumy et al. 2008; Pant et al. 2007; Sougioultzis et al. 2006
5. Szajewska H, Skorka A, Dylag M. Meta-analysis: Saccharomyces boulardii for treating acutediarrhea in children. Aliment Pharmacol Ther 2007;25:257
6. Guandalini S. Probiotics for children with diarrhea: an update. J Clin Gastroenterol 2008;42 suppl 2:
7. Vandenplas Y., Brunser O., Szajewska H. (2009) Saccharomyces boulardii in childhood. Eur J Pediatr 168: 253–265
8. Kurugol Z., Koturoglu G. (2005) Effects of Saccharomyces boulardii in children with acute diarrhoea. Acta Paediatr 94: 44–47
9. Naflesia B.O. Correˆa, _Francisco J. Penna, yFa´tima M.L.S. Lima, zJacques R. Nicoli, and Luciano A.P.Filho(Treatment of Acute Diarrhea With Saccharomycesboulardii in Infants.
10. Levri KM, Ketvertis K, Deramo M, Merenstein JH, D'Amico F.University of Pittsburgh Medical Center/St. Margaret, 3937 Butler Street, Pittsburgh, PA 15201, USA McDonough FE, Hitchins AD, Wong NP, Wells P, Bodwell CE. Modification of sweet acidophilus milk to improve utilization by lactose-intolerant persons. Am J Clin Nutr 1987; 45:570–4.
11. Graff S., Chaumeil J.C., Boy P., Lai-Kuen R., Charrueau C. (2008a) Formulations for protecting the probiotic Saccharomyces boulardii from degradation in acidic condition. Biol Pharm Bull 31: 266–272.

Source of Support: None Declared
Conflict of Interest: None Declared