

NSA

Food, Pro and Prebiotics: Effects Beyond the Gut

Efficacy of milk fortified with a probiotic *Bifidobacterium lactis* (DR-10™) and prebiotic galacto-oligosaccharides in prevention of morbidity and on nutritional status

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Background - Diarrhoea is still the major cause of childhood morbidity and mortality; estimated to cause more than 3 million deaths among children globally. Any non-invasive easily administrable intervention that may affect these morbidities would have very important implications for child health and survival. In recent years there has been increasing evidence for the role of probiotics in treatment of diarrhoea. There are very sparse data on prophylactic probiotic therapy and its effects.

Objective - To evaluate the impact of milk fortified with pre- and probiotics in prevention of diarrhoea and on iron status and growth.

Design - The study was conducted in Sangam Vihar, a peri-urban population in south Delhi. Healthy children aged 1- 3 years, permanent residents in the area and without any chronic illnesses or severe malnutrition were invited to participate. After informed consent 634 children were enrolled and randomly allocated to either receive a milk formulation containing *Bifidobacterium lactis* HN019 (DR-10™) minimum of 10⁷-10⁸ CFU/100 g and galacto-oligosaccharides 2.5 g/100 g (PP Milk), or the same milk without these two. The milk was provided in sachets of 32 g and children were advised to consume up to 3 sachets per day for 12 months. A blood sample was taken to measure the detailed haemogram, ZPP and retic count at baseline and end study. Twice weekly home visitations were done to collect data on morbidity and compliance. At baseline, six months and one year anthropometric measurements (weight, height) were made.

Outcomes - Baseline characteristics of subjects in the two groups were comparable. Compliance was above 80%, with most children consuming at least two serves per day. Supplementation with PP milk resulted in a significant reduction in the incidence of dysentery OR 0.78 (95% CI 0.61, 1.00) as well as prevalence of dysentery OR 0.85 (95% CI 0.71, 1.01). Reduction in incidence of diarrhoea was 10%, but was not statistically significant. Consistent with improved immunity PP milk supplementation caused a significant reduction in the prevalence of severe illness days OR 0.84 (95%CI 0.74-0.95, p<0.001), days with fever OR 0.68 (95%CI 0.54-0.84) and prevalence of ear infections OR 0.93 (95%CI 0.87-1.00). Data on haematological parameters indicate a significant increase in the proportion of children with Hb levels above 10 g/L in the PP milk group. There was also a 35 % reduction in the proportion of iron deficient children and a significant reduction in stress of bone marrow as observed by a increase in the proportion of children with normal retic count, in the PP milk group. Children fed PP milk had significantly better growth at six month and one year assessments. After 1 year the children in the PP milk group had significantly better z scores for WAZ (mean diff 0.22, 95%CI 0.02-0.41; p=0.03) and WHZ (mean diff 0.18, p=0.05), and higher weight gain (mean diff: 130g, 95%CI 30-230; p=0.02).

Conclusions - *Bifidobacterium lactis* HN019 (DR-10™) and galacto-oligosaccharide fortified milk resulted in better iron status even when both groups were receiving iso-caloric diets with the same iron content. This effect could be either due to better absorption due to effects on gut flora or more likely secondary to morbidity prevention effects. There was a significant reduction in bloody diarrhoea and a non significant 10% reduction in all diarrhoea. The magnitude of significant reduction in non diarrheal morbidity suggests effects are most likely on both viral and bacterial infections.

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