

Effect of Probiotics on Markers of Gut Health in Bangladeshi infants



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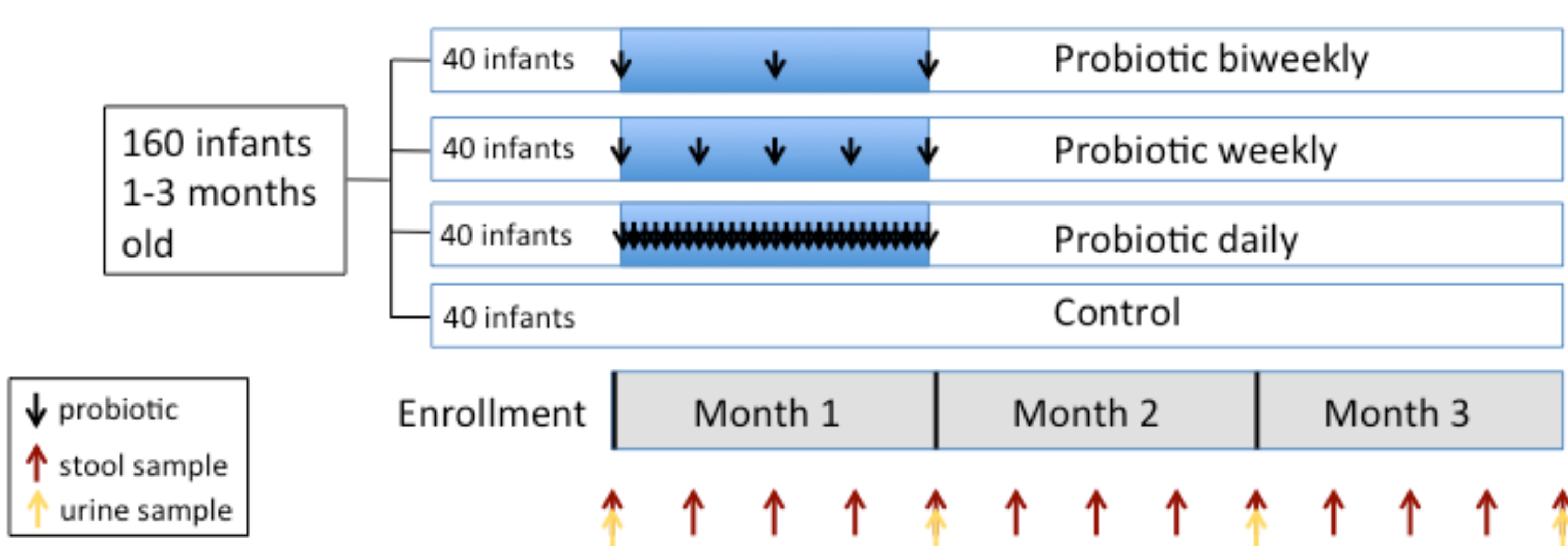
Introduction

Environmental enteropathy is a condition that affects children in low-income settings and results in reduced intestinal absorption and increased permeability. Recent studies suggest that probiotics may be able to affect intestinal absorption and permeability. The objectives of this study are to determine the effect of two probiotics on markers of gut health and environmental enteropathy in Bangladeshi infants.

Methods

Infants age 4 to 12 weeks (N=160) were randomized to one month of a combination of *Lactobacillus reuteri* DSM 17938 and *Bifidobacterium longum infantis* on three different schedules: daily, weekly, or biweekly (every two weeks) or to non-probiotic control and followed for two additional months (Figure 1). Stool samples were collected at baseline and weekly throughout the study and urine samples were collected at baseline and monthly. Intestinal absorption and permeability were estimated using the lactulose-mannitol (LM) ratio. Intestinal markers of inflammation were measured with commercial ELISA assays for myeloperoxidase (MPO) and alpha 1 antitrypsin (A1AT). A preliminary subset of samples is presented here.

Figure 1: Study Design and Sampling Scheme



Results

Lactulose-Mannitol (LM) Assays

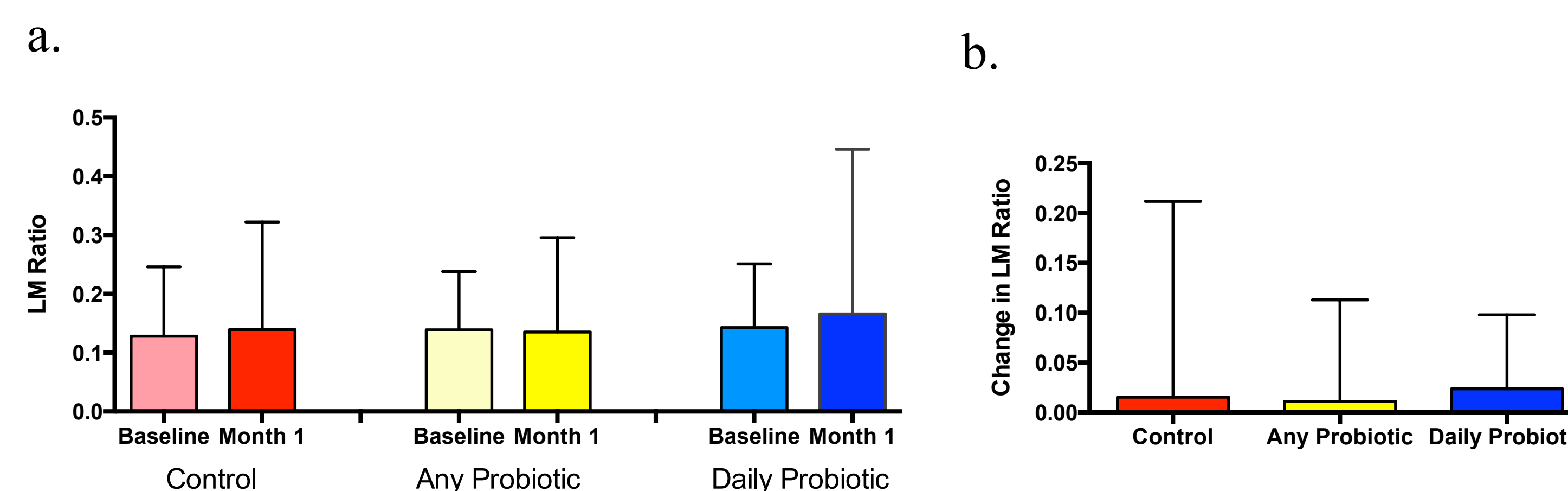
Of 82 infants, 65% at baseline and 65% at month 1 had lactulose/mannitol ratios >0.10 (abnormal), which is indicative of environmental enteropathy (EE).

Table 1: Counts of Normal and Abnormal (EE) LM Ratios by Arm

	Control		Biweekly		Weekly		Daily	
	Baseline	Month 1	Baseline	Month 1	Baseline	Month 1	Baseline	Month 1
Normal	5	7	5	7	10	7	8	7
Abnormal	12	10	12	10	12	15	17	18

Overall the average LM ratio increased from 0.29 (median=0.13) at baseline to 0.50 (median=0.14) at month 1. The change in LM ratio over one month was not significantly different between the control (median=0.02), all probiotic arms combined (median=0.01), and daily probiotic arm (median=0.02).

Figure 2: Lactulose Mannitol (LM) Ratios

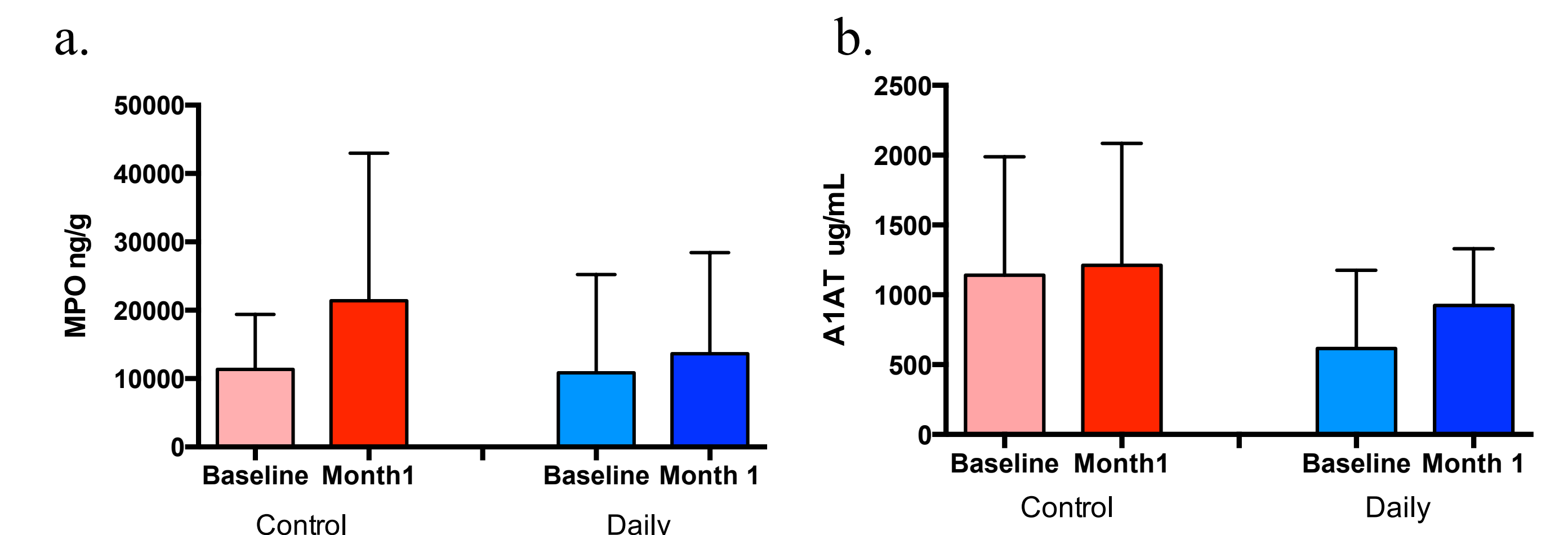


a.) LM levels of control all probiotic arms combined and daily probiotic arms; b.) Change in LM ratio over 1 month. Bars represent median, lines represent IQR. No differences were statistically significant.

Fecal Markers of Intestinal Inflammation

MPO and A1AT levels in 40 infants were also somewhat lower in the daily arm (MPO = 13461ng/g, A1AT = 924ug/ml), than in the control arm (MPO = 21375ng/g, A1AT = 1211ug/ml, MPO p=0.36, A1AT p=0.34) although A1AT also differed prior to probiotics.

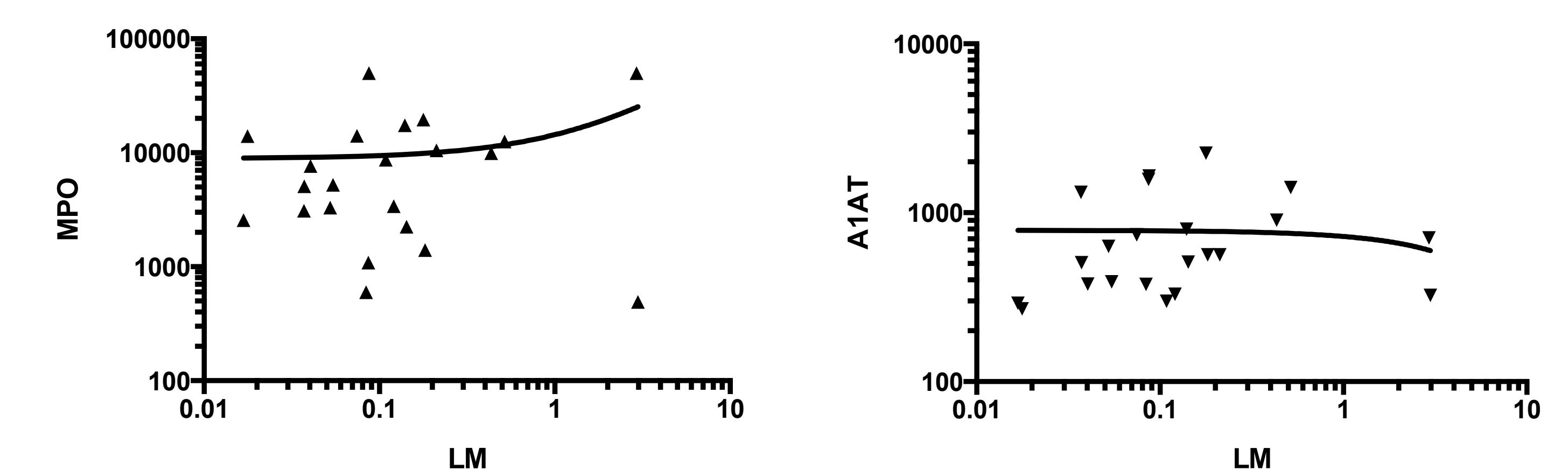
Figure 3: Myeloperoxidase (MPO) and Alpha 1 Antitrypsin (A1AT) Levels



Bars represent mean a.) MPO and b.) A1AT, lines represent standard deviation. No differences were statistically significant.

We did not see any correlation between the LM ratios and MPO and A1AT values in these samples.

Figure 4: Correlations between LM and Markers of Inflammation



Conclusions

The majority of young infants in this population had evidence of inflammation and environmental enteropathy and this increased as the infants got older. We found little evidence one month of administration of our chosen probiotics stalled development of environmental enteropathy in Bangladeshi infants.