CONCLUSION

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SUMMARY
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The seven *Lactobacilli* that showed good growth at low pH were selected for the final phase of study and sequenced and identified by molecular methods to be characterized as *L. plantarum* (three isolates) and *L. fermentum* (four isolates). Their viability was determined at varying pH for different time periods and two strains, one each from the group of the *L. plantarum* and *L. fermentum* isolates were selected for the immunomodulation studies in mice at the level of transcriptional expression of cytokines of Th1 (IFN-γ and IL-2) and Th2 (IL-4 and IL-10) types in Swiss-albino strain of mice.

There was constant increase of Th1 interleukins IFN-γ and IL-2 in *E. coli* administered mice and of Th2 interleukins IL-4 and IL-10 in *Lactobacillus* administered mice. In both cases each skewed the other’s expression but it was greater and dominant in the case of IL-4 and IL-10 in *Lactobacillus* administered mice against the inflammatory cytokines of Th1 type. H & E staining involving the histology of liver showed no sign of inflammatory condition. The texture and morphology of the liver was also normal compared to the control. The spleen also did not show any sign of inflammation. The size of the organ did increase initially but was never abnormal and returned to a normal size as compared with control animal organ.

All these conditions can be taken as an indication of the *Lactobacillus* strains chosen for study to have good potential of probiotic characteristics. Again the suppression of the inflammatory cytokines is an indication of development of tolerance and anergy.
for the *Lactobacilli* antigens compared to the consideration of the *E.coli* being considered a threat as can be seen by the rise in inflammatory cytokines among the *E. coli* administered animal group and non-development of tolerance even on 40\(^{th}\) day of inoculation as compared to the control group.

Thus we can safely conclude that the *Lactobacillus* strains chosen for study have good proven potential for use as probiotics.
SUMMARY:

1. The fermented food products from Assam used for the study had good number of *Lactobacillus species* present in them.

2. The *Lactobacillus* strains showed comparatively good growth in high bile concentration and low pH with a few (seven) isolates showing really good viability at low pH of 2.0. Two of the best were chosen for immunomodulation studies in mice.

3. A good number of *Lactobacillus* strains also showed antipathogenic character against clinically pathogenic isolates of *E.coli* and *Salmonella enterica*.

4. Most of the *Lactobacilli* were sensitive to all the five antibiotics of the three inhibition types available.

5. Mice were inoculated intraperitoneally with the lysate of *Lactobacillus strain* and *E. coli* with normal saline as control.

6. Blood, Spleen and Liver were collected for study. Spleen and liver showed no sign of inflammation or change in morphology or texture as compared to control in *Lactobacilli* administered mice.
7. The level of mRNA expression in liver and blood for Th2 cytokines (IL-4 and IL-10) were many folds higher in the *Lactobacilli* administered mice as compared to control and pathogenic *E.coli* administered mice.

8. The level of mRNA expression in liver and blood for Th1 cytokines (IL-2 and IFN-γ) were many folds lower in the *Lactobacilli* administered mice as compared to the pathogenic *E.coli* administered mice.

9. Both the above points 5 and 6 give an indication of positive cytokine expression for prevention of elimination from host and development of anergy towards *Lactobacilli* antigens thereby making the strains suitable as probiotics which can survive in the host for enough time to express their effects for the benefit of the host.

10. Thus we conclude with the notion of the *Lactobacilli* strains used for the study to be proving their potential as probiotics.