1. INTRODUCTION

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The intestinal microflora is a positive health asset which influences the normal structural and functional development of the immune system of the mucosa in a crucial way. Intestinal microflora forms a natural defence barrier and exerts numerous protective, structural and metabolic effects on the epithelium. The intestinal microbiota is estimated to harbour about $10^{14}$ viable bacteria. The infant gut is colonized shortly after birth. The gut microfloras of the infant are influence by the ecological, genetical and physiological factors. Lactic acid bacteria (LAB) are thought to be predominant in breast fed infant.

LAB are a heterogeneous group of bacteria that produce lactic acid as a major or sole product of fermentative metabolism. LAB are widely present in nature which include gastrointestinal tract of man and animal, fermented food products such as fermented fish and fermented vegetables and milk based products such as cheese and yoghurts. They are generally regarded as safe (GRAS) and form part of the probiotic concept which received considerable attention over the past years (Salminen et al., 1998). LAB are also widely used as probiotic or functional starter organism in food and beverage industry as they are assumed to have a safe history for consumption in the fermented products (Wood and Holzapfel, 1995; Caplice and Fitzgerald, 1999; Leroy and De Vuyst, 2004).

During the past few decades, due to change in lifestyle and increase in pollution, human beings are infected with various kind of diseases. There is rise in prevalence of chronic diseases like different allergies and gut-associated diseases such as ulcerative colitis, crohn disease, inflammatory bowel disease etc since past decades. There has been concern about the spread of antibiotic resistance of bacterial pathogen in the environment, as a result antibiotics are not effective in curing the diseases. There is awareness among the consumer of the link between the diet and the good health. Earlier researches were mainly focussed on the pathogenic bacteria which cause various ailments and there were few researches on the non-pathogenic
bacteria which play a significant role in combating various diseases. But interest on probiotics has increased over the past few decades as people are aware about its positive health impact to the host. The interest in probiotics also stems from the growing awareness among the consumers regarding the safety aspects of the used of chemical drugs. There is rising demand for functional food incorporating probiotic worldwide.

The emerging need of safe and natural therapeutics without any adverse effects could also be one of the main reasons behind the expanding market of probiotics. A common trend is the use of probiotic starter cultures to promote the health and well being of the consumers in fermented products like yoghurt (Bengmark, 2000; Sanders and Klaenhammer, 2001; Parvez et al., 2006). Probiotics being endowed with various beneficial attributes offer tremendous opportunities for their extensive application in almost all segments including food, pharmaceutical and cosmetics industries. About 65% of the European functional food market is covered nowadays with dairy probiotic products (Stanton et al., 2001). India is also fast emerging as a potential market for probiotics in food. The probiotic product industry in India was estimated to be around Rs. 20.6 million with a projected annual growth rate of 22.6% until 2015 (Frost & Sullivan, 2009). Probiotics are defined as “Living microorganisms which upon ingestion in certain numbers exert health benefits beyond inherent general nutrition” (Gorbach, 2002) and play a role in the prevention or treatment of infectious diseases, irritable bowel syndrome, allergies, lactose intolerance, colon cancer and chronically high cholesterol levels (Andersson et al., 2001). A greater interest in understanding the importance of nonpathologic bacteria has resulted in increased research efforts in probiotics. Thus, probiotic strains require investigation to obtain functional products and to satisfy the increasing market demand for probiotics.

Probiotics bacteria can be isolated from different sources, but for human application the probiotic should be of human origin. The human digestive tract is inhibited by various microbes. These microbes are fastidious in nature and their survival at high numbers during the passage through the human gastrointestinal tract (GIT) is a major challenge for effective delivery of these beneficial bacteria (Annan et al., 2008). Among these, LAB are part of the common intestinal microflora and considered beneficial to the host. Gut microorganisms contribute to intestinal microbial balance and play a significant role in maintaining good health. It is important to explore
and identify the indigenous non-pathogenic microorganisms which benefited the host. Since the GIT of infant are the source of probiotic rich LAB, it would be preferable to characterize the LAB from the gut of the infant. Studies on the probiotic characterisation of LAB isolated from the human faeces are scanty in the world in general and in India in particular and no report on such studies from the Northeast India has been reported at the best of my knowledge. Therefore, the aim of the experiment was to isolate and identify the potential candidate of probiotics from the faeces of infant.

The present research work is focussed on four different areas. The first part consists of the isolation and identification of the LAB from the faecal sample of the infant faeces by using conventional technique such as gram staining, catalase test, motility test, sugar fermentation test etc. The second part focussed on the invitro characterisation of the isolated LAB. The third part discussed on the invivo characterisation of the selected LAB from the invitro characterisation and the last part consists of the molecular classification of the LAB which possess probiotic characteristics.

1.2. OBJECTIVES

The main objectives of this study were as follows:

1) To isolate and identify the Lactic Acid Bacteria (LAB) from the infant faeces by using conventional methods.

2) To determine the tolerance of low pH and bile acid.

3) To determine the production of biogenic amines.

4) To examine the antipathogenic activities of LAB on certain pathogen like *E. coli*.

5) To study the antibiotic susceptibility of the selected LAB.

6) To evaluate the *in vivo* properties of LAB using animal model and quantitative estimation of effects of selected LAB on cholesterol of mice.

7) To identify the probotic LAB by using molecular technique.