ABSTRACT

There is a great deal of concern towards the use of antibiotics in food animals and birds, around the world. This is known to contribute in the development and spread of antibiotic resistant organisms. Evidences are now mounting that antibiotic resistance in pathogens being detected is due to non human antibiotic use. In line with human pathogens, now-a-days increased attention is being driven towards the safety of bacteria applied in food. Among food microorganisms, lactic acid bacteria (LAB) are natural and profitable inhabitants of diverse environments including vegetables, soil, gastrointestinal tract etc. Although antibiotic resistance in LAB is not detrimental to well being of humans and animals, there is, however, a concern that they might participate in the transfer of resistance to human pathogens.

Although antibiotic resistance in LAB has been reported from several developed countries, data from developing countries such as India is either negligible or absent. In this context, the present research was undertaken to investigate the prevalence of antibiotic resistance in particular, erythromycin resistance (ER\(^r\)) in LAB from diverse food sources. In addition, ER\(^r\) is also accompanied with tetracycline resistance (TC\(^r\)) as they are often found co-existing. To achieve this, selective screening with erythromycin was carried out and a total of 60 LAB cultures encompassing species of Enterococcus, Lactobacillus,
*Pediococcus* and *Leuconostoc* were isolated from *idli* batter, dairy products (milk, curd Khoa, buttermilk) and chicken sausages.

With a diversified phenotypes of ER$^r$, the LAB isolates harbored resistance genes such as *erm*(B), *msr*(C), *tet*(M), *tet*(L), *tet*(K), *tet*(W) and *lnu*(B) on either plasmids or chromosome. Among the several LAB, *erm*(B) gene was found associated with *tet*(W), *tet*(L), *tet*(M), *lnu*(B) and *msr*(C) on single plasmids of *Enterococcus* or *Lactobacillus* species. Phenotypic induction studies with macrolides suggested diverse MIC values with macrolides, lincosamides and streptogramin B (MLS$_B$) antibiotics. These observations revealed the importance of performing phenotypic tests before the use MLS antibiotics in combination for possible treatment of enterococcal infections. Genetic expression studies showed the induction of *tet*(W) gene in presence of high concentrations of the antibiotic (tetracycline) substantiating the survival of these bacteria in antibiotics challenged environments.

Subsequently, *in vitro* conjugation studies were carried out with selected LAB isolates and the indicated the plasmid mediated transfer of ER$^r$ and TC$^r$ gene to *Enterococcus faecalis* JH2-2 strain. The findings of the overall investigation revealed the prevalence of antibiotic resistant LAB in diverse fermented foods. The presence of several erythromycin and tetracycline resistance genes and the ability to transfer these genes to pathogens indicated the potentiality of LAB in disseminating antibiotic resistance through food chain. Thus, bacterial isolates
such as LAB intended for use as starter cultures or probiotics need to be evaluated for transferable antibiotic resistance genes to curb its (antibiotic resistance) spread.