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Probiotic using and acid-bile resistance of *Enterococcus faecium* strains isolated from traditional naturally fermented white cheese in Iran and Turkey

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In this study, *E. faecium* RT 81, RI 41, RI 56 strains were isolated from white cheese produced in different regions of Iran and Turkey. All isolates and *E. faecium* DSMZ 20447 reference strains were examined for their abilities to survive at pH 2.0, 3.0, 4.0, 5.0, 5.5, 6.2 and in the presence of 0.06, 0.15 and 0.30% bile salts. Analysis of the low pH tolerance of all *E. faecium* strains was accomplished by incubating the strains in acidic MRS broth for 24 hours and then the cell growth was measured spectrophotometrically. Optical density significantly decreased the tolerance at the pH values of 4.0, 3.0 and 2.0. In these pH values, percent inhibition rates were determined as 96-97%. Strains maintained at pH 5.0 or higher showed no noticeable reduction in growth, while all the strains showed reduction in tolerance during incubation at pH 2.0 and 3.0. *E. faecium* RT 81 strain showed lower inhibition (12.98%) at pH 5.5 conditions than the other strains. pH values of 2.0, 3.0 and 4.0 could be considered as critical for the selection of potential probiotic *Enterococcus* spp. Tolerance to bile salt is essential for probiotic strains to colonize the small intestine. In the present study, we have determined the tolerance of three isolated strains and a reference strain of *E. faecium* to bile salts by including oxgall in the growth medium. For *E. faecium* DSMZ 20447 strain, there was an increase in percent inhibition after 24 hours of incubation at bile salt concentrations of 0.06, 0.15 and 0.30%. On the other hand, the growth of RT41 and RT 56 strains was stimulated with increasing concentration of bile salt. 0.30% bile salt concentration showed a slight inhibition on *E. faecium* RT 81 (26.05%). In conclusion, results showed that although the tolerance of *E. faecium* strains is affected by pH 2.0 3.0 and 4.0, most of the tested strains survived well at pH 5.0. Different bile salt conditions have little effect on the tolerance of *E. faecium* strains. The findings indicate that survival at pH 5.0 and pH 5.5, together with bile salt tolerance ability can be used for preliminary screening in order to identify potentially probiotic bacteria suitable for human or animal use.

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Effect of encapsulation on the viability of probiotics in yoghurt

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It is well established that probiotic bacteria exert myriad of beneficial effects on human health, including antibiotic therapy, improved symptoms of lactose intolerance, resistance against cancer, reduced incidence of diarrhea in humans and production of antimicrobial substances and reducing cholesterol level. The objective of this study was to evaluate the stability of probiotics in the yoghurt with and without encapsulation. Probiotic yoghurt was compared with control yoghurt in terms of chemical, physical, microbial and sensory properties over a period of 15 days of storage. Yoghurt was prepared with free lactic acid bacteria and with encapsulated bacteria and was stored at 4°C. Yoghurt was subjected to physiochemical and microbial analysis. The addition of the probiotic bacteria in the yoghurt samples either in encapsulated or without encapsulation significantly affected the results for pH, lactose, acidity, viscosity and syneresis. However, the addition of the culture of probiotic either in free or encapsulated form did not bring any distinct difference in color, flavor and taste over the 15 days of storage period.

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