Immune Regulatory Effect of Newly Isolated Lactobacillus delbrueckii from Indian Traditional Yogurt

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Lactic acid bacteria (LAB) are microorganisms that are believed to provide health benefits. Here, we isolated LAB from Indian fermented foods, such as traditional Yogurt and Dosa. LAB from Yogurt most significantly induced TNF-α and IL-1β production, whereas LAB from Dosa induced mild cytokine production. After 16S rRNA gene sequencing and phylogenetic analysis, a Yogurt-borne lactic acid bacterium was identified and classified as Lactobacillus delbrueckii subsp. bulgaricus, and it was renamed L. delbrueckii K552 for the further studies. Our data suggest that the newly isolated L. delbrueckii can be used for the treatment of immune deficiency disorders.

Keywords: Lactic acid bacteria, Lactobacillus delbrueckii, tumor necrosis factor-alpha, interleukin-beta, Indian fermented foods
joining tree based on 16S rRNA gene sequences shows the phylogenetic relationships between *Lactobacillus* and Y-52, with the bar indicating 0.02 substitutions per nucleotide position (Fig. 3). Bootstrap analysis with 1,000 replicates was also conducted in order to obtain confidence levels for the branches. Most of the species in *Lactobacillus* were included in the phylogenetic tree. Y-52 was identified as *L. delbrueckii* subsp. *bulgaricus*. Thus, Y-52 was renamed as *L. delbrueckii* K552 for the further studies.

*Lactobacillus* species have been used as probiotics for a long time in human history [4]. For example, *L. plantarum* reduces serum cholesterol, LDL-cholesterol, and triglyceride levels [10], and attenuates inflammatory bowel disease [6]. *L. rhamnosus* suppresses allergic sensitization and airway

**Fig. 1.** Cytokine induction by newly isolated LAB. THP-1 cells were stimulated with LAB isolated from Indian traditional fermented Yogurt and Dosa for 4 h. To make inactivated LAB, they were incubated in an 80°C water bath for 20 min. The production of TNF-α (A) and IL-1β (B) was estimated by ELISA using culture supernatants. Representative data from LAB (e.g., Y-52 from Yogurt and nD-62 from Dosa) are shown. *S. aureus* (S. au) was used as the control. Values are the mean ± SD of three independent experiments.

**Fig. 2.** Dose- or time-dependent effects of LAB on cytokine induction. THP-1 cells were stimulated with the indicated dose of bacteria for 4 h and the levels of (A) TNF-α and (C) IL-1β production were analyzed using ELISA. Cells were incubated with 1 x 10^6^ cells of LAB for the indicated time and the levels of (B) TNF-α and (D) IL-1β were analyzed using ELISA. Bacteria Y-52 and nD-62 were isolated from Yogurt and Dosa, respectively. *S. aureus* (S. au) was used as the control. Data are expressed as the mean ± SD.
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References


