

Potentiality of self-cloned *Lactobacillus plantarum* Taj-Apis362 for enhancing GABA production in yogurt under glucose induction: optimization and its cardiovascular effect on spontaneous hypertensive rats

ABSTRACT

The current study evaluated the γ -aminobutyric acid (GABA) producing ability from three novel strains of lactic acid bacteria (*L. plantarum* Taj-Apis362, assigned as UPMC90, UPMC91, and UPMC1065) co-cultured with starter culture in a yogurt. A combination of UPMC90 + UPMC91 with starter culture symbiotically revealed the most prominent GABA-producing effect. Response surface methodology revealed the optimized fermentation conditions at 39.0 °C, 7.25 h, and 11.5 mM glutamate substrate concentration to produce GABA-rich yogurt (29.96 mg/100 g) with desirable pH (3.93) and water-holding capacity (63.06%). At 2% glucose to replace pyridoxal-5-phosphate (PLP), a cofactor typically needed during GABA production, GABA content was further enhanced to 59.00 mg/100 g. In vivo study using this sample revealed a blood pressure-lowering efficacy at 0.1 mg/kg GABA dosage (equivalent to 30 mg/kg GABA-rich yogurt) in spontaneously hypertensive rats. An improved method to produce GABA-rich yogurt has been established, involving shorter fermentation time and lower glutamate concentration than previous work, along with glucose induction that omits the use of costly PLP, fostering the potential of developing a GABA-rich functional dairy product through natural fermentation with desirable product quality and antihypertensive property.

Keyword: Antihypertensive; Fermentation; GABA; Optimization; Rat study; Yogurt