

Production of Medicinal Bio-active Amino Acid Gamma-Aminobutyric Acid In Dairy Sludge Medium

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Abstract : Introduction: Gamma-aminobutyric acid (GABA) is a non-protein amino acid that is widely present in organisms. GABA is a kind of pharmacological and biological component and its application is wide and useful. Several important physiological functions of GABA have been characterized, such as neurotransmission and induction of hypotension. GABA is also a strong secretagogue of insulin from the pancreas and effectively inhibits small airway-derived lung adenocarcinoma and tranquilizer. Many microorganisms can produce GABA, and lactic acid bacteria have been a focus of research in recent years because lactic acid bacteria possess special physiological activities and are generally regarded as safe. Among them, the *Lb. Brevis* produced the highest amount of GABA. The major factors affecting GABA production have been characterized, including carbon sources and glutamate concentration. The use of food industry waste to produce valuable products such as amino acids seems to be a good way to reduce production costs and prevent the waste of food resources. In a dairy factory, a high volume of sludge is produced from a separator that contains useful compounds such as growth factors, carbon, nitrogen, and organic matter that can be used by different microorganisms such as *Lb.brevis* as carbon and nitrogen sources. Therefore, it is a good source of GABA production. GABA is primarily formed by the irreversible α -decarboxylation reaction of L-glutamic acid or its salts, catalysed by the GAD enzyme. In the present study, this aim was achieved for the fast-growing of *Lb.brevis* and producing GABA, using the dairy industry sludge as a suitable growth medium. *Lactobacillus Brevis* strains obtained from Microbial Type Culture Collection (MTCC) were used as model strains. In order to prepare dairy sludge as a medium, sterilization should be done at 121 ° C for 15 minutes. *Lb. Brevis* was inoculated to the sludge media at pH=6 and incubated for 120 hours at 30 ° C. After fermentation, the supernatant solution is centrifuged and then, the GABA produced was analyzed by the Thin Layer chromatography (TLC) method qualitatively and by the high-performance liquid chromatography (HPLC) method quantitatively. By increasing the percentage of dairy sludge in the culture medium, the amount of GABA increased. Also, evaluated the growth of bacteria in this medium showed the positive effect of dairy sludge on the growth of *Lb.brevis*, which resulted in the production of more GABA. GABA-producing LAB offers the opportunity of developing naturally fermented health-oriented products. Although some GABA-producing LAB has been isolated to find strains suitable for different fermentations, further screening of various GABA-producing strains from LAB, especially high-yielding strains, is necessary. The production of lactic acid, bacterial gamma-aminobutyric acid, is safe and eco-friendly. The use of dairy industry waste causes enhanced environmental safety. Also provides the possibility of producing valuable compounds such as GABA. In general, dairy sludge is a suitable medium for the growth of Lactic Acid Bacteria and produce this amino acid that can reduce the final cost of it by providing carbon and nitrogen source.

Keywords : GABA, *Lactobacillus*, HPLC, dairy sludge

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