Examination of health promoting effect of fermented milk protein

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Budapest

2024

Abstract

Lactic acid bacteria due to their ability to convert carbohydrates, primarily sugars, into lactic acid not only contributes to the unique flavors and textures of fermented foods but also creates a hostile environment for spoilage and pathogenic bacteria. This research delves into the multifaceted potentials of lactic acid bacteria cultures in the realms of food preservation and health enhancement. Research has increasingly focused on their potential as antioxidant and antimicrobial agents, opening exciting avenues for the food and health industries. These versatile microbes are crucial in producing functional foods with improved health benefits, including better mineral absorption, protection against oxidative stress, and cardiovascular health enhancement. Oxidative stress, caused by the accumulation of free radicals, is implicated in various chronic diseases. LAB have demonstrated the ability to produce antioxidant compounds that can scavenge these harmful molecules, potentially mitigating the risk of chronic illnesses.

Fermented milk products are considered functional foods due to their potential nutritional value and health benefits. They are rich in various nutrients such as calcium, phosphorus, potassium, vitamins, and high biological value proteins, these different components affect number of functions of the body in a positive way.

Bioactive components are specific protein fragments can also be found in fermented milk, play a crucial role presented by positively impacting various body functions and contributing to overall health ingredients. These bioactive molecules are usually found in the primary sequence of the protein and need to be released and free through processes such as hydrolysis by digestive enzymes, or enzymatic cleavage by proteases from microorganisms. Bioactive peptides have been extensively studied for their health benefits, and due their antimicrobial and antioxidant properties.

The study aims to comprehensively evaluate the performance of different LAB cultures under varying conditions through milk protein concentrate fermentation, with a focus on glucose concentration, mixed cultures versus monocultures, and pH environment.

The investigation encompasses seven diverse LAB cultures, including monocultures and mixed cultures, namely YoFlex Mild 1.0, ALC-01, CHN-22, ABY-1, Lacto 7, *Lactobacillus acidophilus* 150, *Lactobacillus acidophilus* LA-5, and various mixtures thereof.

The DPPH method was applied to measure the antioxidant activity of compounds. It involves the use of 1,1-diphenyl-2-picrylhydrazyl (DPPH), a stable free radical, which reacts with antioxidants to produce a colour change that can be measured spectrophotometrically. The antimicrobial activity was determined by agar well diffusion method against pathogens.

Mono and mixed cultures of LAB were added to the MPC solution and were left to ferment at 37ºC to have hopefully bioactive peptides will be formed. Then it was tested for its antioxidant effect, with glucose concentrations of 2.5% and with no glucose.

Through meticulous experimentation and analysis, the research identifies optimal conditions for maximizing the bioactivity of LAB cultures. Findings reveal that the presence of glucose generally enhances the antioxidant activity of LAB cultures, with notable variations across strains and concentrations. Lacto 7 emerges as a standout performer in terms of antioxidant activity, particularly at higher glucose concentrations. Additionally, ALC-01 and Mix strains demonstrate significant antimicrobial efficacy, underscoring their potential as natural alternatives to conventional antibiotics.

The results highlight the intricate relationship between fermentation conditions, acid production, and bioactive compound synthesis in LAB cultures. Furthermore, the study sheds light on the complex dynamics of microbial inhibition and the impact of environmental pH on antimicrobial activity. Neutralizing acidic environments generally reduces the zone of inhibition, suggesting pH as a critical determinant of LAB efficacy in food matrices.

In addition to exploring the antioxidant potential, this research also delved into the antimicrobial activity of lactic acid bacteria LAB cultures under various conditions. The findings shed light on their efficacy in combatting pathogens, thus further enhancing their relevance in both food preservation and healthcare applications.

- ALC-01 exhibited the strongest overall antimicrobial activity when paired with 2.5% glucose.
- Mix strains displayed broad-spectrum antimicrobial activity, particularly notable at a glucose concentration of 2.5%.
- Lacto 7 demonstrated moderate antimicrobial effects, showing improved performance at a glucose concentration of 2.5%.

- Among the pathogens tested, E. coli 8739 exhibited the highest sensitivity to lactic acid strains.

In summary, this research contributes valuable insights into harnessing the full potential of LAB cultures for food preservation and healthcare applications. By elucidating the roles of glucose concentration, mixed cultures, and pH environment, the study lays the groundwork for the development of innovative solutions to address pressing challenges in food safety and public health. Continued research and collaboration are essential to fully exploit the multifunctional properties of LAB cultures and promote human health and well-being.