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Commentary Article

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Co-Microencapsulation of Lactobacilli Cell Free and Propolis Extracts Inhibits the Growth of Foodborne Pathogens

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COMMENTARY

Natural antimicrobials and antioxidants derived from probiotic bacteria and polyphenols are becoming more popular as consumers health consciousness grows. One of the most common probiotics is Lactic Acid Bacteria (LAB). Organic acids, fatty acids, peptides, bacteriocins, enzymes, vitamins, and other unknown compounds can be produced. *Lactobacillus plantarum* is one of the most prevalent species in the Lactobacillus genus because to its technical abilities and excellent probiotic properties. *Lactobacillus reuteri* is a common probiotic that can convert glycerol into reuterin (3-hydroxypropionaldehyde), a broad spectrum antibacterial agent.

Propolis, often known as bee glue, is a dark colored, resinous sticky component found in nature. Polyphenols (flavonoids, phenolic acids and their esters, phenolic aldehydes, alcohols, and ketones), sesquiterpene quinones, coumarins, lignans, steroids, amino acids, aromatic acids, and inorganic chemicals are all found in propolis. Propolis, often known as bee glue, is a dark colored, resinous sticky component found in nature. Polyphenols (flavonoids, phenolic acids and their esters, phenolic aldehydes, alcohols, and ketones), sesquiterpene quinones, coumarins, lignans, steroids, amino acids, aromatic acids, and inorganic chemicals are all found in propolis. According to the United States Food and Drug Administration, propolis and the majority of LAB are "generally recognized as safe" (US FDA). When compared to fresh probiotic cells, Cell Free Extract (CFE) from LAB had better anti-pathogenic properties and consistency throughout storage.

The food business uses encapsulation to integrate bioactive components into various food items, which protects them from harmful environmental conditions and therefore increases product shelf life. Microencapsulation is described as the formation of micro particles ranging in size from 0.2 µm to 5,000 µm. Spray drying, freeze-drying, co-acervation, emulsion-based processes, co-crystallization, extrusion, supercritical fluid-based processes, spray chilling, ultrasound-based processes, and liposomes, among others, might be utilised for microencapsulation. Spray-drying is a well-known encapsulation technology in the food and pharmaceutical sectors due to its higher applicability and scalability, as well as its reduced process cost.

According to several studies, the synergistic effects of more than one bioactive molecule would significantly improve their bioactivity and usefulness when compared to single compounds alone. No prior research have investigated the antibacterial efficacy of co-microencapsulated CFE of *Lactobacillus spp.* and propolis extracts on gram-negative and positive food borne pathogens, as far as we are aware. To address this information gap, we sought to assess the bioactive components of CFE derived from *Lactobacillus* strains (*L. plantarum* FI 8595 and *L. reuteri* ATCC 55730) and propolis extracts (aqueous and ethanolic). Second, the impact of microencapsulating CFE from *lactobacilli* alone or in combination with propolis extracts on the development of *Staphylococcus aureus* ATCC29213, Listeria monocytogenes ATCC19112, *Klebsiella pneumoniae* ATCC700603, and *Salmonella paratyphi* A NCTC13 was studied.

The encapsulation procedure was modified from that of Marcela, Luca, Esther, and Elena (2016). Individually encapsulated CFE from *L. plantarum* and *L. reuteri* Co-microencapsulations were created by combining propolis ethanolic or water extract (1%) with CFE from *L. plantarum* or *L. reuteri*.