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The Potential Of Postbiotic By *Lactobacillus Casei Shirota (Lcs)* In Benzoapyrene (Bap) Polycyclic Aromatic Hydrocarbon (Pahs) Degradation

Nur Athierah Azman[a], Khalilah Abdul Khalil

Structured Abstract

Background: Polycyclic aromatic hydrocarbons (PAHs) are carcinogenic chemicals widely found in food that pose serious health hazards. Benzo[a]pyrene (BaP), a form of PAH, is particularly hazardous and has been related to an elevated risk of cancer from dietary exposure. This backdrop emphasizes the possibility of utilizing postbiotics from *Lactobacillus casei strain Shirota* (LcS) to breakdown BaP. Postbiotics, the inactive components of probiotics, have showed promise in breaking down PAHs. By using LcS-derived postbiotics, BaP levels in contaminated food can be greatly lowered, limiting carcinogenic exposure. This strategy not only improves food safety but also helps to prevent cancer, making it a promising solution to the public health problem caused by dietary PAH contamination.

Methods: The postbiotic component of *Lactobacillus casei strain Shirota* (LcS) has been obtained by centrifugation of a Yakult beverage pellet. Benzo[a]pyrene (BaP), a Polycyclic Aromatic Hydrocarbon (PAH), was produced by dissolving concentrated BaP in acetonitrile. The LcS postbiotic and benzo[a]pyrene were then mixed in MRS broth and incubated to facilitate the degradation reaction. The incubation periods were set to 0, 2, 4, 6, and 24 hours. Turbidity measures, pH alterations, and gas chromatography-mass spectrometry (GC-MS) studies were all used to determine the extent of degradation.

Results: This study's findings show a reduction in medium turbidity with benzo[a]pyrene and LcS postbiotic after 24 hours of incubation, indicating successful degradation. This turbidity reduction was accompanied by a pH increase toward neutral levels, demonstrating that benzo[a]pyrene's density and toxicity decreased after incubation with the postbiotic. Furthermore, GC-MS analysis revealed a substantial decrease in the degradation peak between samples incubated for 0 and 24 hours.

Conclusion: Overall, the observed decrease in turbidity and GC-MS peak, combined with the increase in pH, suggest that the postbiotic Lactobacillus casei strain Shirota (LcS) successfully degrades benzo[a]pyrene in the medium. Prolonged incubation is recommended to enhance the degradation process facilitated by the LcS postbiotic.

Keywords: *Lactobacillus casei* Strain Shirota (*LcS*), postbiotic, Benzo(a)pyrene, Polycyclic Aromatic Hydrocarbon,

*Correspondence: nurnadiah@uitm.edu.my

[a] School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

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