Biopeptides Derived from Whole Milk Fermentation by Co-culture of *Lacticaseibacillus casei* (LBC 237) and *Limosilactobacillus fermentum* (LBF 433): Peptidomics of Peptides with Potential Anti-inflammatory Activity

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Bioactive peptides with anti-inflammatory activity have garnered growing interest due to their therapeutic potential in modulating the inflammatory response and as alternatives to traditional anti-inflammatory drugs. Frequently derived from food proteins, these peptides are released through hydrolysis and act on specific molecular pathways, such as COX-2. This study aimed to identify the peptidomic profile associated with the biochemical properties of these biopeptides using milk fermentation through bacterial co-culture. Following initial identification, in silico tools were employed to analyze the biochemical properties and predict the bioactivity of the peptides. A total of 730 peptides were identified, with 50.41% showing anti-inflammatory potential. Based on hydrophobicity, similar to that of aspirin (50.54%), 84 peptides were initially selected, narrowed down to 10 final biopeptides through rigorous screening for anti-inflammatory activity, low allergenicity, absence of toxicity, and good water solubility. The analysis revealed an average of 11.8 fragments, a molecular mass of 1400.26 Da, and an isoelectric point (pI) of 7.01, with an average hydrophobicity of 52.36%. The amino acid composition showed 6.20 hydrophobic residues and good solubility, suggesting effective interaction with cell membranes. These findings indicate the potential of biopeptides as safe and effective therapies, modulating inflammatory responses without adverse effects.

Keywords: Bioactivity; COX-2; Aspirin; Biotechnology