

Antimicrobial Activity of Postbiotic Derived from *Lactobacillus gasseri* and *Lactobacillus johnsonii* against Methicillin-Resistant *Staphylococcus aureus* (MRSA)

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Structured Abstract

Background: Methicillin-resistant *Staphylococcus aureus* (MRSA) is a multidrug-resistant pathogen that causes serious infections such as otitis media, osteomyelitis, suppurative pneumonia, endocarditis pyogenic, skin and soft tissue pyogenic infection and accelerating health problems globally. The non-viable products of microbes, postbiotics, are proving to be a stable and safe substitute of the antibiotics. This research explores postbiotic derived from *Lactobacillus johnsonii* and *Lactobacillus gasseri* have antimicrobial potential on MRSA.

Methods: There was two LAB strains inoculated into three media, these were MRS broth, Tryptic Soy Broth (TSB) and New Formulation (NF). The extraction of postbiotics was performed through heat inactivation and freeze-drying. The antibacterial efficacy was analysed through well diffusion assay, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). The antibiotic control used was chloramphenicol. The inhibition zone, MIC and MBC values were measured, calculated and analysed using a One-way ANOVA and Tukey's post-hoc test.

Results: The most significant activity against MRSA was reported in postbiotics produced by *L. johnsonii* in MRS and *L. gasseri* in NF, with both showing increased inhibition zones, lower MIC and MBC values than other combinations. Postbiotic remedies overtook chloramphenicol in effectiveness in some situations. The use of statistical test proved that there was a difference between treatments and control as the value of ($p < 0.05$).

Conclusion: In conclusion, the findings of this study showing the strongest antimicrobial activity against MRSA was found in *L. johnsonii* in MRS broth and *L. gasseri* in NF postbiotics that yielded the largest inhibition zones, and the lowest MIC and MBC values as compared to other combinations. Moreover, postbiotic therapies derived from *L. johnsonii* and *L. gasseri* were better than chloramphenicol. The statistical analysis has shown that the difference between the treatments and the control had significant differences ($p < 0.05$). The objectives of this study have been achieved.

Keywords: Postbiotics, *Lactobacillus gasseri*, *Lactobacillus johnsonii*, MRSA, antimicrobial activity, well diffusion assay, MIC, MBC, antibiotic resistance

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