

Antibacterial Activity of Postbiotic From *Lactobacillus rhamnosus* GG (LGG) against Methicillin Resistant *Staphylococcus aureus* (MRSA)

Eva Olivia Damianus^{a*}, Muhammad Fareez Ismail^{a*}

Structured Abstract

Background: In recent years, the focus has shifted towards postbiotic as the alternative treatment of diseases. This is because new scientific evidence stated that the viability of probiotics is not obligatory to derive the beneficial health benefits as the metabolites of the live bacteria are the driving force behind it. The metabolites of the probiotics are found beneficial as a potential antibacterial compound to inhibit the growth of pathogens. In recent years, the increasing prevalence of Methicillin Resistant *S.aureus* has posed significant challenges which lead to limited treatments options and higher mortality rates. Therefore, in this study, the antibacterial properties of postbiotic from LGG against MRSA were investigated.

Methods: LGG was cultured in both tryptic soy broth (TSB) and de man, rogosa and sharpe (MRS) broth. After 24 hours of incubation, LGG culture was heat killed at 80°C for 10 minutes to obtain postbiotic. Next, the postbiotic solutions were freeze-dried at -80°C for eight days. Next, well diffusion agar assays were performed to observe the inhibitory activity of postbiotic against MRSA. Subsequently, Minimum Inhibitory Concentration (MIC) was conducted by measuring the absorbance of 96-well plates that contained different concentrations of postbiotic. Following this, 20 µl of the treatment from each well was streaked onto agar plates to determine Minimum Bactericidal Concentration (MBC). Finally statistical analysis was performed.

Results: The zone inhibition of TSB postbiotic treatment against MRSA at 30 ul and 10 ul were 8.08 mm 6.68 mm respectively. No zone of inhibition observed from MRS postbiotic treatment. The MIC of TSB postbiotic and MRS postbiotic are 40% and 50% respectively. The MBC of TSB postbiotic is 100 µl while no bactericidal concentration of MRS postbiotic was observed.

Conclusion: In conclusion, it is found that postbiotic from LGG exhibit antibacterial activity and the selection of an appropriate growth medium plays a crucial role in the study. The growth of *Lactobacillus rhamnosus* GG (LGG) is highly dependent on the medium used, and this, in turn, influences the production of postbiotic components and metabolites. Therefore, optimizing the growth medium is essential to maximize the production of effective postbiotics for antibacterial activity.

Keywords: Postbiotic, *Lactobacillus rhamnosus* GG (LGG), Methicillin resistant *Staphylococcus aureus* (MRSA), Well diffusion agar, Antibacterial Activity

*Correspondence: fareezismail@uitm.edu.my

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