

## **Gallic acid loaded graphene oxide based nanoformulation (GAGO) as potential anti-bacterial agent against staphylococcus aureus**

### **ABSTRACT**

Staphylococcus aureus (SA) is the most common occurring bacterial pathogen that caused skin and soft tissue infections. However, the emergence of multi-drug resistant strains such as methicillin-resistant SA (MRSA) compromises therapy and poses a serious challenge to human health. Therefore, the need to develop alternative novel anti-bacterial agents is crucial. Nanomaterials are alternatives to treating and mitigating infections caused by resistant bacteria as bacteria are unlikely to develop resistance towards nanomaterials. In the present study, we have incorporated gallic acid (GA), a bioactive compound onto graphene oxide (GO), with a view to enhance the anti-bacterial potential of GA. Gallic acid loaded graphene oxide based nanoformulation (GAGO) has the capability to load GA at  $76.08 \pm 6.823\%$ , resulting in a GA loading of  $0.942 \pm 0.002$  g/g of GAGO. The GAGO was further characterized using techniques such as FT-IR spectroscopy and scanning electron microscopy (SEM). The anti-bacterial activity of GAGO was evaluated by disc-diffusion method using both MRSA and methicillin-sensitive SA (MSSA) at concentrations of 50-500  $\mu\text{g/mL}$  for 18 h. The anti-bacterial activity of GA against MRSA increased significantly at lower concentration when loaded onto GAGO nanoformulation. Fundamentally, the results obtained highlighted the potential development of GAGO as anti-bacterial agent against multi-drug resistant bacteria.

**Keyword:** Gallic acid; Graphene oxide; Anti-bacterial; Staphylococcus aureus

