

ABSTRACT

Titanium is widely used as a dental implant material due to its favorable biocompatibility and osseointegration properties. However, titanium surfaces are susceptible to bacterial colonization, leading to biofilm formation and resulting in peri-implantitis, with a reported prevalence of 22% and an implant failure rate of 8.78% per year. *Pseudomonas aeruginosa*, an opportunistic multidrug-resistant bacterium, has been identified as a major pathogen that is difficult to eradicate because of its strong biofilm-forming ability. Therefore, this study was conducted to evaluate the effect of chitosan–curcumin coating on titanium surfaces in inhibiting *Pseudomonas aeruginosa* biofilm formation.

This experimental laboratory study was conducted using three groups: Group I (uncoated titanium), Group II (chitosan coating), and Group III (chitosan–curcumin coating), with four samples in each group. The coating process was performed using the layer-by-layer dip-coating technique, initiated with a polyethyleneimine (PEI) layer as a base to enhance adhesion between titanium and chitosan. Titanium samples (n = 12) were immersed in a *Pseudomonas aeruginosa* suspension and incubated at 37 °C for 24 hours. Biofilm inhibition was assessed using the crystal violet assay and measured with a spectrophotometer at a wavelength of 540 nm. Statistical analysis was performed to compare biofilm inhibition among the treatment groups.

The results of the study demonstrated that the chitosan–curcumin coating produced the highest inhibition of *Pseudomonas aeruginosa* biofilm formation, as indicated by a statistically significant reduction in optical density values ($p < 0.05$) compared to the control group and the chitosan-only group. It was concluded that the chitosan–curcumin coating applied to titanium surfaces exerted a significant effect in reducing *Pseudomonas aeruginosa* biofilm formation

Keywords: titanium, biofilm, *Pseudomonas aeruginosa*, chitosan, curcumin