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Phelligridin D-loaded oral nanotube titanium implant support bone formation and osseointegration in rat mandible

The major causes of implant failure are poor bone quality and osteolysis in dentistry. Phellinus baumii has been traditionally used as a medicine in Korea, Japan and China. Phellinus baumii extract exhibits anti-inflammatory, antioxidant, anti-obesity, and anti-platelet activities. Phelligridin D belongs to the family Hymenochaetaceae isolated from the mushroom Phellinus baumii. In this study the effect of phelligridin D loaded on titanium (Ti) nanotube implant surface and bone formation around implant were tested. The purpose of this study was to enhance osseointegration of phelligridin D loaded implant to the bone and to prevent from osteolysis support bone formation. Cell viability, crystal violet staining, Western blot, alizarin red S staining, alkaline phosphatase activity, tartrateresistant acid phosphatase staining, micro-computed tromography (μ -CT), haematoxylin and eosin (H&E), and immunohistochemical staining were used in vitro and in vivo for the biocompatibility of phelligridin D as a potential osseointegration. Phelligridin D promoted osteoblastic differentiation and mineralization by increasing bone morphogenic protein-2/7 (BMP-2/7), osterix, Runx-2, osteoprotegerin (OPG), alkaline phosphatase, and by reducing osteoclast differentiation by inhibition of receptor activator of nuclear factor kappa-B ligand (RANKL) in MC-3T3 E1 cells. Also, phelligridin D supported bone formation around nanotube Ti implant surface through the increment of BMP-2/7 and OPG and confirmed by µ-CT and H&E staining in rat model. Also, phelligridin D inhibited osteolysis molecule, RANKL. These findings support that phelligridin D as a new compound representing a promising candidate for the treatment of implant failure due to osteolysis and poor bone quality in teeth.

Biography

Shrestha Takanche Jyoti has obtained his Master's degree from Chonbuk National University School of Dentistry. Currently, he is in the process of acquiring a PhD degree from Chonbuk National University School of Dentistry. He is studying on Oral Inflammation and Implant Osseointegration. He has published articles on Oral Biochemistry and Oral Implant in reputed journals.

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