DOI : 10.35124/bca.2020.20.S1.3015

Biochem. Cell. Arch. Vol. 20, Supplement 1, pp. 3015-3021, 2020 | www.connectjournals.com/bca | *ISSN 0972-5075*

THE COMBINATION OF *EPIGALLOCATECHIN-3-GALLATE* AND PLATELET RICH PLASMA IN PERIODONTAL LIGAMENT STEM CELLS FOR JAW OSTEOMYELITIS THERAPY : A REVIEW

Martining Shoffa Puspitaningrum[1], Desintya Rahmadhani[1], Yuniar Rizqianti[1], Rini Devijanti Ridwan[2], Arif Nur Muhammad Ansori[3], Amaq Fadholly[3], Raden Joko Kuncoroningrat Susilo[4], Nastiti Faradilla Ramadhani[5] and Alexander Patera Nugraha[6*]

[1]Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.
[2]Department of Oral Biology, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.
[3]Doctoral Program in Veterinary Science, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.
[4]Doctoral Program in Mathematics and Natural Sciences, Faculty of Science and Tech., Universitas Airlangga, Surabaya, Indonesia.
[5]Department of Dentomaxillofacial Radiology, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.
[6]Department of Orthodontics, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.
*Corresponding author e-mail: alexander.patera.nugraha@fkg.unair.ac.id

(Received 10 February 2020, Revised 17 April 2020, Accepted 20 April 2020)

ABSTRACT : Osteomyelitis is an inflammatory disease which can occur in the jaw and may be complicated to another chronic disease. The existing therapies are using antibiotics and surgical therapy. However, these therapies can cause the bacteria resistance and invasiveness on the tissue. The combination of Epigallocatechin-3-Gallate (EGCG) and Platelet Rich Plasma (PRP) on Periodontal Ligament Stem Cells (PDLSCs) using the local injection method can be used as an alternative treatment to decrease the resistance and prevent the invasiveness on the tissue. The aim of this review was to summarize the tissue engineering used for jaw osteomyelitis therapy. PRP contains various important growth factors (PDGF, HGF, IGF-1, EGF, VEGF, TGF-â and FGF), chemokines and cytokines is necessary to induce the osteoid, collagen and extracellular matrix formation. PDLSCs have the ability and multipotent capacity to differentiate into cementoblasts, osteoblasts, adipocytes and collagen-forming cells. EGCG can increase RUNX2, Osterix and BMP-2. Furthermore, it can decrease RANKL, HMGB1 and HSP-70 expression. Thus, it can be an osteoinduction in osteogenic processes.When EGCG and PRP are integrated with PDLSCs, PRP improves the cell sheet reconstruction, the elevated role of PDLSCs that can trigger osteogenic gene expression of MiR-17 and hsa-mir-218, and stimulate the expression of ALP, RUNX2, Col-1 and OCNLP. This combination also increases the osteogenic differentiation, the aggregation, and cohesiveness of particulate-based bone for alveolar bone remodeling. Moreover, the combination of EGCG and PRP in PDLSCs has the potential to treat jaw osteomyelitis.

Key words : Epigallocatechin-3-gallate, Platelet rich plasma, periodontal ligament stem cell, jaw osteomyelitis, medicine.

INTRODUCTION

Jaw osteomyelitis is a rare bacterium related to the inflammatory disease in developed countries (Patel and McGurk, 2010). This infection is prevalent in developing countries (Junior *et al*, 2010), despite the introduction of antibiotics and the improvement of dental and medical care (Baltensperger and Eyrich, 2009). In USA, the incidence of osteomyelitis in the jaws is reported to be around 3 to 4 cases per 100,000 annually (Qaisi and Montague, 2017). Jaw Osteomyelitis need a long-term therapy which sometimes causes disfigurement and dysfunction in the affected area (Kamakshi *et al*, 2016). The etiology of jaw osteomyelitis includes hematogenous germ spread, drug or radiation-related, or local odontogenic or non odontogenic infection (Kusuyama *et al*, 2013). The most common cause of osteomyelitis of the jaw is dental infection, followed by trauma including traumatic fractures and usually the following compound fractures (*i.e.* those that communicates with the mouth or the external environment) (Peravali *et al*, 2011). Etiological factor that causes jaw osteomyelitis by pathogenic organisms are for example bacteria, fungi, viruses, and parasites (Birt *et al*, 2017). Certain pyogenic bacteria and mycobacteria are the most common infections that cause osteomyelitis (Rosenberg and Khurana, 2016).

Osteomyelitis occurs more commonly in the mandible than in the maxilla (Kamakshi, 2016). This is because the maxilla has a better blood supply, thin cortical plates and