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INDUCING SCHWANN CELLS INCREASE USING FREEZE-DRIED PLATELET-RICH PLASMA FOR CHRONIC CONSTRICTION NERVE INJURY IN RAT MODEL

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ABSTRACT : Neuropathic pain is a chronic pain condition and it refers to all pain initiated or caused by primary lesions or transient dysfunction or disorders of the peripheral or central nervous system (CNS). Neuropathic pain is caused by damage or injury to nerves that transfer information to the brain and spinal cord from the skin, muscles and other body parts. Platelet concentrates such as Platelet-Rich Plasma (PRP) have been used for tissue regeneration because it contains high Growth Factor. PRP was tested for nerve injury to examine the potential of PRP in nerve repair improvement. The purpose of this study was to prove the PRP role in increasing the number of Schwann cells for nerve repair. This study used three-month-old *Rattus novergicus* experiment animals. The experimental animals were randomly divided into seven groups, with six rats per group. On the day 14 and 21 post-treatment, the rats were sacrificed. Schwann cells were calculated using Hematoxylin Eosin staining. The results were analyzed using ANOVA statistical tests and Independent T-test. On day 21, rats treated with single-dose Platelet-Rich Plasma in the treatment group demonstrated increased Schwann cell growth $p<0.05$ (0.000) in comparison to the ligation group. However, it was not significantly different in comparison to the single PRP treatment on day 14 with $p>0.05$ (0.219). Platelet-Rich Plasma treatment can increase the number of Schwann cells for neuroregeneration. Administering a single dose of Platelet-Rich Plasma for 21 days was the most effective treatment for neuroregeneration.

Key words : Schwann cell, platelet rich plasma, nerve, neuroregeneration.

INTRODUCTION

Orofacial pain includes many disorders, including temporomandibular disorders (TMD), trigeminal neuralgia, headaches and myofascial pain; and it occurs in 23% of the populationand 7–11% of them are chronic pain (Krzyzanowska *et al*, 2012; Benoliel *et al*, 2015). Chronic pain associated with damage to the nerve tissue, disrupting pain modulation in the nerve and is often referred to as neuropathic pain (Damasceno *et al*, 2016; Tender *et al*, 2013). It was estimated that 37.6 million people suffered from neuropathic pain in 2005, and the prevalence increased to 39.1 million in 2011. Some neuropathic pains in orofacial are trigeminal neuralgia, glossopharyngeal neuralgia, postherpetic neuralgia, and peripheral neuropathic (due to malignancy and diabetes mellitus) (Wang *et al*, 2014). Other neuropathic pains in orofacial are stomadynia (burning mouth syndrome), phantom tooth pain (atypical odontology) and traumatic nerve injuries (Benoliel *et al*, 2015). Inflammatory components may present in neuropathic pain; therefore, effective management requires several types of medication.

Neuroregeneration is needed for neuropathic pain therapy as it may occur due to nerve tissue damage. Neuroregeneration or repair of nervous tissue means regrowth or recovery of nervous tissue, cells, or products of cells (Winias S et al, 2020). Schwann cells play a critical role in nerve regeneration. Nerves in the peripheral nervous system (PNS) consist of many axons myelinated by Schwann cells. In the event of nerve damage, Schwann cells help by phagocytizing their axons and guiding them into the regeneration target.

Pharmacotherapy for neuropathic pain has limitations, and it usually utilizes NSAIDs and opioids in symptomatic therapy to reduce pain (Jaggi *et al*, 2011). Therefore, new neuropathic therapies to regenerate damaged nervous tissue are in need. One of the neuropathic treatments is Platelet-Rich Plasma (PRP) therapy. PRP does not only stop the degeneration process of necrotic tissue, but it also improves regeneration (Maghsoudi *et al*, 2015; Kon *et al*, 2010).