

INVOLVEMENT OF THE NLRP3 IN ACTIVATING THE IMMUNE RESPONSE AFTER RESIN HEMA EXPOSURE IN DENTINE-PULP COMPLEX

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ABSTRACT : This study aimed to investigate the involvement of the NLRP3 in activating the immune response after resin monomer 2-hydroxyethyl methacrylate (HEMA) exposure in dentine-pulp complex. The research samples were 28 male Sprague Daley rats in randomized post-test only control groups. The rats were randomly divided into 4 groups, with 7 rats per group. Group 1, the control group was treated with glass ionomer cement restoration (Fuji IX LC) without HEMA application after the lower molar was drilled using a low speed round bur. Group 2-4, the experimental groups were treated with HEMA liquid (Sigma Aldrich) and sealed with glass ionomer cement restoration after the lower molar was drilled using a low speed round bur, and the teeth in each group were extracted after 24, 48 and 72 hours accordingly. The teeth were soaked into EDTA for 8 weeks, then cut 5milimicron by microtome then made the paraffin block. Immunohistochemistry staining was smeared using anti NLRP3 antibody monoclonal. The samples were then statistically analyzed using ANOVA and Tukey HSD. The NLRP3 expression of odontoblast reached the highest number at 48 hours of experimental time. NLRP3 has a role in activating the immune response after resin HEMA exposure in dentine-pulp complex.

Key words : NLRP3, resin HEMA, odontoblast, medicine, dentine-pulp complex.

INTRODUCTION

Composite resin is an aesthetical restorative material commonly used in dentistry for filling dental cavities. The adhesive materials have become one of the most important things for the practice of the conservative aesthetical dentistry. The adhesive materials enable procedures such as bonding of direct and indirect resin restorations, posts, brackets and aesthetical correction (Matos *et al*, 2017). The dentine bonding agents are resin-based materials used to create a composite bond between dentine and enamel (Gupta *et al*, 2014).

Most of the adhesive materials consist of 22-hydroxyethyl methacrylate (HEMA). HEMA is a stable bonding material, which functions as a base and/or as mixed material. HEMA has a good chemical bond strength and hardly degradable; therefore, it makes a proper and durable restoration (Anusavice *et al*, 2013). HEMA diffusion into the dentin tubules can cause irritation on the pulp. The chemical materials can be observed from the ability to stimulate cell death. Residual monomers from HEMA can induce an inflammatory reaction from the pulp. HEMA contains free radicals hydroxyl that can stimulate oxidative stress. ROS is an important feature

that can be obtained from the resin monomer exposure (Paeanjpe *et al*, 2005; Widjiastuti *et al*, 2019).

The body has a defense system to protect itself against injury called the immune system. The immune system is composed of an innate and adaptive immune system. The innate immune system is the front liner in eliminating infections. Firstly, to recognize antigens that enter the body, pattern recognized receptors (PRR) are needed. Cellular receptors recognize the microbes and foreign objects as pathogen-associated molecular patterns (PAMPs) and damaged associated molecular patterns (DAMPs). PRR is in the plasma membranes or endosomal membranes and cytosols of various cell types. If the cells bind to PAMP and DAMP molecules, the transduction signal will be activated to protect the host (Abbas *et al*, 2012). DAMP molecules can be produced as a result of the cell damage caused by infections and sterile lesions such as toxins from chemicals, trauma, burns, compression force, or decreased blood supply (Nugraha *et al*, 2020). The innate immune system enhances the ability of cells to recognize pathogens through PRR that can detect infection or cell damage in the cytoplasm.