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EXPRESSION OF ENDOGENOUS ANTIOXIDANT IN DENTINE PULP COMPLEX AFTER HEMA RESIN APPLICATION

Widya Saraswati[1]*, Febriastuti Cahyani[1], Yovita Yonas[2], Saindra Arsa Gumilang[2], Yansha Mutia Dyah Kusumastuti[2], Nina Dhaniar[2] and Hermawan Adi Praja[1]

[1]Department of Conservative Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.
[2]Resident of Department of Conservative Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

*e-mail: widya-s@fkg.unair.ac.id

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ABSTRACT : Free radicals can react with polyunsaturated acid in cellular membrane in DNA and caused cellular damage. In order to prevent tissue damage, reactive oxide metabolite should be eliminated through and enzymatic antioxidant such as superoxide dismutase (SOD), catalase, thioredoxin and glutathione peroxidase. *Sprague Dawley* rats were divided into 4 groups. 1 control group and 3 experimental groups. The tooth cavity in the control group was filled with glass ionomer cement without HEMA liquid resin. Tooth cavities in experimental groups were treated with HEMA liquid resin and then filled with glass ionomer cement. The teeth were extracted after 24, 48, and 72 hours. Immunohistochemistry staining was applied to investigate the expression of SOD and catalase. The observation was done under a light microscope. Test data were analyzed using the ANOVA test and Tukey HSD. Significant differences between SOD and Catalase were observed in the control group and experimental groups. There was no significant difference between the experimental groups (24, 48 and 72 hours). There was increased production of Catalase and SOD in dentine pulp complex after being applied with resin HEMA.

Key words : Superoxide dismutase, catalase, immunohistochemistry, medicine, odontoblasts.

INTRODUCTION

Highly reactive molecules called free radicals can cause tissue damage by reacting with polyunsaturated fatty acids in cellular membranes, nucleotides in DNA and critical sulfhydryl bonds in proteins (Machlin and Bendich, 1987). In order to prevent tissue damage, the causative, which is a reactive oxidative metabolite, should be eliminated through an enzymatic antioxidant system such as superoxide dismutase (SOD), catalase, thioredoxin and glutathione peroxidase.

An antioxidant is a compound that gives out an electron. In other words, a compound that is able to muffle out the negative impact of oxidant. The exaggerated Reactive Oxygen Species (ROS) will be dissolved by primary endogenous antioxidant. The antioxidant system will keep the redox balance of the tissue, which will trigger pathogenic lesion cleansing and regulate the signaling of the important molecules to keep the balance of the physiology process (Sadi *et al*, 2014).

Resin monomer is a material in dentistry that is broadly used in composite resin, bonding and cement resin. Hydroxyethyl methacrylate (HEMA) is one of the material that is contained in dentin bonding. HEMA has a favorable characteristic for a restoration material such as having good bonding because it is hydrophilic and is not easily degraded, therefore, increasing the restoration survivability (Anusavice *et al*, 2003; Gerzina *et al*, 1996).

The usage of HEMA in dentistry needs intraoral polymerization that this material should have at least 30% unpolymerized monomer (Bakopoulou *et al*, 2009).

Some research mentioned that these monomers would release residual monomer that can potentially have a negative impact on the tooth and oral cavity (Goldberg *et al*, 2008; Hamid *et al*, 1998; Paranjpe *et al*, 2005). HEMA can lead to apoptosis by involving ROS in oxidative stress conditions (Schweikl *et al*, 2006).

The objective of this research was to analyze and prove should there be any increased expressions of SOD and catalase in dentine pulp complex as the result of the HEMA application.

MATERIALS AND METHODS

This was an experimental laboratory study with a randomized post-test only control design. This study was approved by the Health Research Ethical Clearance