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ROBUSTA COFFEE BEANS DECREASE OF INFLAMMATION IN DENTAL CARIES

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INTRODUCTION

The coffee plant is one commodity that is developed in kabuapaten Jember. Coffee chemical constituents, such as flavonoids, xanthine, antioxidants, alkaloids, polyphenols may serve as anti-inflammatory, antibacterial, platelet aggregation. Polyphenol bioavailability of coffee has also been studied.[1.2.3] While Namboodiripad, K. Srividya (2009) proved their coffee inhibition zone against S. mutans. The immune response of dental caries among others related to cytokines are expressed odontoblast layer, such as IL-1β, IL-1α and TNF-α.[4.5] Thus it is said that coffee is thought to inhibit dental caries by means of modulating the immune response. This ni accordance with the Decree of the Minister of State for Research and Technology of the Republic of Indonesia Number: 02 / M / Kp / II / 2000 on Development and Engineering for National Development (JAKSTRA 2000-2004) in the field of dentistry which has two areas of research focus include health field for prevention and treatment of diseases and new materials related to ceramics, polymer composites, engineering materials (materials science and engineering), as well as new material derived from ingredients that are natural.[6] One of the natural ingredients that are known to everyone is coffee. Where coffee is one of the excellent programs that can improve the performance of Jember University's Strategic Plan.

This type of coffee is widely known in Indonesia there are three kinds, namely Arabica, Robusta and Liberika. In general, farmers grow robusta, because in this type of coffee has more superior properties, so it is very fast growing. Even the coffee is the dominant species of coffee plantations in Indonesia. In addition, it contains prolifenol Robusta coffee, caffeine and chlorogenic acid, which is higher than the other coffee types. Currently, the production of robusta coffee production reached third copies worldwide.[7.8] Coffee brews are very widely consumed in the world due to their pleasant flavor and taste as well as for their stimulating effect on the mental and physical activities. Several years ago, in California, a research conducted by Takayuki Shibamoto, a professor of environmental toxicology, found that freshly brewed coffee contains potent antioxidants equal to the amount found in three oranges. Antioxidants in general have been linked to a number of potential health benefits, including protection against heart disease and cancer, protection against liver and colon cancer, type 2 diabetes, and Parkinson's disease..[9] Coffee chemical constituents, such as flavonoids, xanthine, antioxidants, alkaloids, polyphenols may serve as anti-inflammatory, antibacterial, platelet aggregation.[1.2.3] Roasted coffee also has anti-adhesive properties which prevent adhesion of S. mutans and other harmful materials on the teeth and whiten teeth.[4] Previous research by a team of other researchers of Excellence coffee beans for the treatment of cancer of the oral cavity, an article on Potential immunomodulatory coffee beans to dental caries and the potential immunomodulatory Robusta beans to dental caries.[10.11.12] In this study Robusta beans made in the form of pasta because pasta Shape is the most popular because it can be easily used and harden quickly.

Capping pupa is one of the more conservative treatments to prevent dental caries has been on the pulp or pulp exposure due to mechanical factors. Interest Capping pulp to maintain the vitality of dental pulp. Pulp tissue is important in the formation of secondary dentine and reparative dentin in response to biological and pathological stimuli. Capping pulp is the application layer or the protective material or materials for treatment over an open pulp, such as calcium hydroxide which will stimulate the formation of reparative dentin.[13] Capping pulp after the treatment, the healing process will occur in the pulp tissue covering the inflammatory response, collagen formation and the formation of new dentin. Inflammatory response should occur as a sign of the host defense. Acute inflammation occurs a few minutes, hours or days, while chronic inflammation occurs after acute inflammation. Inflammatory played by inflammatory cells such as PMN (polymorphonuclear, mononuclear cells (monocytes, macrophages, lymphocytes, mast cells, plasma cells). PMN are cells leading that respond to injury and most frequently

seen in inflammation. These cells react in the early stages of inflammation (acute) up to 28 hours, followed by macrophages, lymphocytes and plasma cells (chronic).[14] Chronic inflammation is said to be the beginning of the healing process. Although the response innate was important in inflammation, but an adaptive response also plays a role, because cytokines were producted by T cells induce inflammation. To obtain optimal care, the necessary understanding in depth about how the composition, antibacterial properties, biocompatibility, effect on dentin and pulp as well as the technique of using a resin adhesive as a material Capping pulp directly. In handling damage teeth, either by decay or trauma, maintain vital pulp tissue remains the most important things to be done by a dentist because of the non-vital teeth, the teeth tend to be susceptible to fracture. The development of the field of conservation science teeth adapted to the development of basic science related and technological advances applied which is the development of science in the field of clinical (clinical science). Dental conservation therapy aims to maintain its position of teeth as long as possible in order to work longer. This objective can be achieved by treating the hard tissue or soft tissue of a tooth to tooth structure back to normal, or at least close to normal.[15]

METHOD

Preparation of research include the cancellation extract Robusta beans and pasta at the Faculty of Pharmacy, University of Jember, maintenance Ethical Clearance at the University of Gajah Mada. Further research on male Wistar rats with age and weight of the uniform. Animals, divided into 5 groups (each with 4 tails). KO: the group made a hole in the tooth, KP1; the group made a hole in the tooth + by Capping CaOH2. KP2: group made a hole in the tooth + by Capping coffee bean paste fillings 25% + while. KP3: group made a hole in the tooth + by Capping coffee bean paste fillings 50% + while KP4: group made a hole in the tooth + by Capping coffee bean paste fillings 75% + while. Cavities are made to the perforations in the pulp chamber under local anesthetic in infiltration around the teeth punched. Day 7, 14, 21, the rats were sacrificed, extracted teeth and surrounding tissue, fixed in 4 days with 10% formalin and then decalcified with 15% EDTA for 60 days. The next process deparafinisasi, paraffin blocked, soaked in PBS, drip with 0.025% trypsin, washed with PBS 3x, drip with H2O2 were washed with PBS 3x, cutting with microtome and HE staining. Inflammatory cells (PMN, macrophages, lymphocytes) were observed under a light microscope at 400 times magnification field of view 3. Data were analyzed using ANOVA followed Ui LSD.

RESULT

The observation of histological inflammatory response (PMN cells, macrophages, lymphocytes) in the dental pulp of Wistar rats treated with Robusta coffee bean paste can be seen in the table and figure below. In this study was observed at day 7, 14 and 21.

Table 1. Average Number of Inflammatory Cells Results Histological observation on dental pulp

Research groups	Day 7	Day 14	Day 21
K0	82	93	78
KP1	72	66	42
KP2	73	65	43
KP3	72	66	42
KP4	72	64	42

Table 1 shows the group made a hole in the tooth (K0) the highest number of inflammatory cells, while the treatment group either pulp capping using Ca (OH) 2 (KP1) and pulp capping use Robusta beans (KP2, KP3, KP4) there is no difference. This is evidenced by ANOVA and LSD test with results no significant difference between treatment groups were well Capping pasta coffee beans (25%, 50%, 75%) mapun Ca (OH) 2 (p> 0.05). Histologically overview of inflammatory cells in the group treated with a paste of Robusta beans is shown in Figures 1, 2, 3.

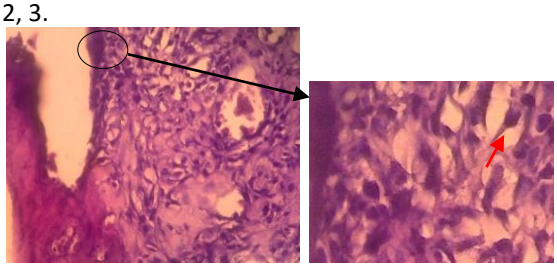

Figure 1. Photo Microscopic treatment group seven days (red arrow is PMN)

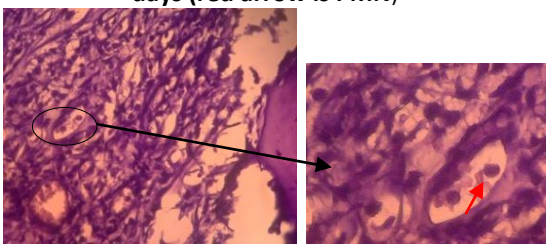

Figure 2. Microscopic photos treatment group at day 14 (red arrows are mononuclear cells)

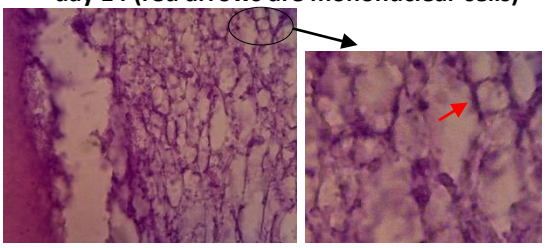

Figure 3. Microscopic photos Group Treatment day 21 (red arrows are fibroblasts)

The treatment group uses Robusta coffee beans as an ingredient Capping dental pulp with a concentration of 25%, 50% to 75% and Capping Ca (OH) 2 gives almost the same results. The treatment group uses Robusta coffee beans as an ingredient Capping dental pulp with a concentration of 25%, 50% to 75% and Capping Ca (OH) 2 gives almost the same results. On day 7 (Figure 1) increased inflammatory cells and predominantly PMN cells. Day 14 (Figure 2) decreases the inflammatory cells, where PMN decreases whereas mononuclear cells (macrophages and lymphocytes) more. Day 21 (Figure 3) reduced inflammatory cells and more dominated by fibroblasts.

DISCUSSION

One important sign of inflammation is the emigration of leukocytes to the lesion area. Inflammatory response caused by the use of materials Capping pulp with Robusta beans on Wistar rats showed that the results do not differ significantly from the use of Ca (OH) 2. This response relates to the number of PMN cells, macrophages and lymphocytes. So it can be said that Robusta coffee beans (concentration of 25%, 50%, 75%) as Capping dental pulp has anti-inflammatory effects similar to Ca (OH) 2. Where inflammation in this research related to the PMN cells, macrophages and lymphocytes.

7 days after application Capping pulp material, visible count increased inflammatory cells, particularly cells PMN. This is understandable because of PMN cells are cells that play a role in acute inflammation. This study is consistent with research Melamed et al that Chemotaxis was higher in the coffee period at all concentrations. This exploratory study suggests that coffee intake modifies various measures of the immune function. The clinical relevance of the findings is not clear, and further studies aimed at delineating the constituents responsible for the effects observed are recommended.[16] PMN cells will respond immediately when there is injury, or a cell leader in responding to the lesion. PMN cell activity will take place until 48 hours, after which it will gradually decline and be replaced macrophage cells. Components of primary (azurophilic) granules of polymorphonuclear leukocytes (PMNs) have been implicated as important mediators in pulpal inflammation. PMN cell function is to eliminate the lesion by way of phagocytosis. In the event of phagocytosis, granules containing digestive enzymes and cytotoxic protein released into phagocytic vesicles. Each cell can only afford one PMN phagocytic activity, then lysis.[14.17] The increase in the number of inflammatory cells in the pulp capping use Robusta beans suspected because of the caffeine content. Caffeine in coffee robusta contains as much as 1.6 to 2.4%, was instrumental in the development of immunity against bacterial resistance by increasing the concentration some immunokompeten cells and strengthen the activity of lysozyme.[18] Increased activity of lysozyme is allegedly associated with phagocytic activity.

Day 14 and 21 Capping pulp Robusta beans or Ca (OH) 2 decreases the number of inflammatory cells, which are shown more of mononuclear cells (macrophages and lymphocytes) than PMN cells. The reduced number of PMN cells caused by chronic inflammatory processes, so that its role was replaced macrophages and lymphocytes. Chronic inflammatory duration would extend to weeks and weeks, months or even years). This response in the form of active inflammation, tissue damage and healing process. Chronic inflammation can occur after acute inflammation, but when there is acute inflammation would accompany slowly and continuously. Macrophages are the predominant cells in chronic inflammatory reactions. Of blood, monocytes migrate to various tissues and differentiate into macrophages. The life span of about one day blood monocytes, macrophages, while the age range of a few months to several years. Macrophages can be stimulated by microbial products through multiple receptors as TLRs and also by cytokines IFN-γ. Macrophages in the phagocytosis process will produce NO, ROS and enzymes lysozom to eliminate pathogens. Lymphocyte cells will be found also on the 14th day of inflammatory cell function to release the antibody when it turns into plasma cells. Consisting of lymphocytes B lymphocytes, T lymphocytes and natural killer cells (Natural Killer).[14] Lymphocytes, together with monocytederived macrophages, are common participants in inflammatory responses associated with various forms of tissue injury, ranging from normal wound repair to the inflammatory. In some instances, it has been assumed that the presence of T lymphocytes signifies some form of immune response in association with the tissue injury.[19] The decline in the number of inflammatory cells were decreased at day 14 and 21, allegedly because the flavonoids, xanthine, klorogenic acids, alkaloids in Robusta beans. Flavonoids act as anti-inflammatory, analgesic, antioxidant.[18] The mechanism of flavonoids in inhibiting the inflammatory process by inhibiting capillary permeability, inhibits the metabolism of arachidonic acid and enzyme secretions lysosomes of cells neutrophils and endothelial cells. Flavonoids play an important role in maintaining and increasing the permeability of the capillary vascular resistance. Therefore, flavonoids used in pathological conditions such as interference with the permeability of the blood vessel walls. Flavonoids are mainly working on microvascular endothelium to reduce the occurrence of

hypermeability and inflammation. Some flavonoids can inhibit the release of arachidonic acid and enzyme secretions from the lysosome membrane to block off the road cyclooxygenase and lipoxygenase pathways resulting in lower levels of prostaglandin and leukotriene (inflammatory mediators).[20]

The 21st day of use Capping pulp Robusta beans or Ca (OH) 2, inflammatory cell numbers will decline and be replaced by fibroblasts. This phase has been a healing process, which will form the collagen fibroblasts. From the above it can be presumed role as the Robusta coffee bean pulp Capping can reduce inflammation and speed the healing process. Although the scientific evidence regarding the anti-inflammatory properties of coffee is mixed, some studies suggest that drinking coffee can be an acceptable part of an anti-inflammatory diet. Although the scientific evidence regarding the anti-inflammatory properties of coffee is mixed, some studies suggest that drinking coffee can be an acceptable part of an anti-inflammatory diet.[21]

CONCLUSION

The conclusion of this research is Robusta beans pasta as pulp capping material decrease inflammatory response similar to the pulp capping material Ca (OH) 2.

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