Original article:

The Comparison of Antibacterial Activity Between Cresophene and Garlic on Isolated of Bacteria in The Necrotic Deciduous Tooth

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Abstract:

Background: This study aims to compare the ability of two medicaments between cresophene and garlic on antibacterial activity of isolate deciduous necrotic teeth. Methods: In vitro test to see the antibacterial activity was carried out on the aerobic and anaerobic bacteria taken straight from the necrotic tooth of pediatric patients (aged 4-7 years old) that treated for endodontics in Pediatric Dental Clinic of RSGMUGM Prof Soedomo. Bacterial identification using the CLSI Standardized Method 2012 and Biochemical identification by Thermo Scientific Rapid System 2010 guideline. In this identification, was founded three species: Prevotella bivia, Serratia marcescens and Clostridium innocum. This test was carried out quantitative measurements to see the inhibition zone of bacterial growth. Whether cresophene has antibacterial potential test results from using an analytical descriptive test that was tabulated. Study group treated with cresophene in a well of 0.7 cm at a dose of 75 µL, garlic extract at a dose of 75 µL divided into five groups with concentrations of 20%, 40%, 60%, 80%, and garlic filtrate. Comparison of the cresophene and garlic effect conducted in vitro by looking at the inhibition zone of the bacterial growth. Results: In all groups, there are inhibitory zones. Cresophene against bacteria Prevotella bivia (54mm), Clostridium innocum (30 mm), Clostridium perfringens (26 mm), Serratia macescens (26 mm), S.mutans (54 mm), while garlic extract against bacteria Prevotella bivia, Clostridium innocum, Clostridium perfringens, S.mutansdonot show againt inhibitory, Serratia macescens (10mm, in concentration of 80 %) and garlic filtrate against bacteria Prevotella bivia (51 mm), Clostridium innocum (28 mm), Clostridium perfringens (46 mm), Serratia marcescens (31 mm), S.mutans (49 mm). Conclusion: Cresophene has a greater inhibition than garlic extract, but it is lower than garlic filtrate.

<u>Keyword:</u> cresophene, garlic, bacterial isolates, necrotic, anti-bacteria.

International Journal of Human and Health Sciences Vol. 04 No. 04 October'20 Page: 287-290 DOI: http://dx.doi.org/10.31344/ijhhs.v4i4.215

Introduction

Dental and oral health problems are still a complaint of the people of Indonesia. National data on dental health in Indonesia shows the prevalence of dental caries of children aged 4-5 years in urban areas 90,5 % with an average def-t of 7,92, while in rural areas 95,9% with an average def-t of 7,98. Dental caries in deciduous teeth is an important health problem. If dental caries is left or not treated adequately, the development of bacteria in the coronal pulp will increase, and inflammatory response occurs. When infection of

microorganisms in the coronal pulp to the radicular pulp results in irreversible pulpitis and necrose.³ Pulp necrose where the pulp tissue is dead as a pulp defense system, can not withstand stimulation so that the number of damaged pulp cells becomes more numerous and occupy a large part of the pulp chamber. Damaged pulp cells will die and become antigenic cells for the most part pulp that is still alive.⁴ In an infected root canal system, several species of anaerobic bacteria are found. Anaerobic bacteria are bacteria that can develop quickly in areas that have little oxygen or even no

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oxygen at all. Bacteria that can be found in the infected pulp canal include *Enterococcus faecalis*, *Streptococcus anginosus*, *Bacteroides gracilis*, and *Fusobacterium nucleatum*.⁵

Treatment of deciduous teeth with pulp necrosis, namely pulpectomy. Root canal treatment by sterilizing the root canals with irrigation and giving medicament. Provision of root canal medicament aims to obtain antimicrobial activity in the root canal, neutralize debris residues in the root canal, control and prevent pain.

Root canal medicament drugs including Chkm/CMPC (Camphorated Parachlorophenol), cresophene (para monochlorophenol), eugenol, formocresol. Cresophene (paramonochlorophenol) has strong antibacterial, used as deep cavity sterilization. In vitro and in vivo studies show that cresophen (paramonochlorophenol) effective in weakening various microorganisms found in infected root canals.

Garlic is widely known among the people of Indonesia, especially in rural or rural areas. Garlic has been used all over the world to treat many conditions, including hypertension and infections. Garlic is one of the most studied medicinal plants and its antibacterial activity depends on allicin produced by the enzymatic activity of allinase (cysteine sulfoxidelyase). Allicin and other thiosulfinates are believed to be responsible for various therapeutic effects. There is a lot of literature on the antibacterial effect of garlic extract. Garlic extract has been reported to inhibit the growth of various gram-positive and gramnegative bacteria. ¹⁰

This study aims to compare the ability of two medicaments between cresophene and garlic on antibacterial activity of isolate deciduous necrotic teeth.

Material and Methods

Aerobic and anaerobic bacteria are taken directly from the teeth with a diagnosis of open and closed pulp necrosis of patients who come to the Pediatric Dental Clinic Prof. Soedomo RSGM of the Faculty of Dentistry, Gadjah Mada University. This bacterial species was bred and inoculated on agar media in the Microbiology Laboratory of the Faculty of Medicine, Gadjah Mada University Research is carried out with a qualitative test by looking at the phenotype profile. After knowing the bacterial phenotype profile in all samples, identification of dominant bacteria was carried out in clinical isolates of necrotic deciduous tooth root canals. Bacterial identification using the *CLSI Standardized Method* 2012 and *Biochemical*

identification by Thermo Scientific Rapid System 2010 guideline. Three types of dominant bacteria were determined as a reference for testing antibacterial activity in vitro. In this identification, was founded three species: Prevotella bivia, Serratia marcescens and Clostridium innocum. Three types of bacteria found in isolates of necrotic deciduous teeth (Prevotella bivia, Serratia marcescens and Clostridium innocum) test to the anti-bacterial inhibitory activity with a comparative bacterium, namely Streptococcus mutans (ATCC 35688) as a comparison Serratia marcescens and Clostridium perfringens as a comparison Prevotella bivia and Clostridium innocum. The study protocol procedure was and approved by the ethics commission and advocate of the Faculty of Dentistry at Gadjah Mada University.

Results

Bacteria have been identified Serratia marcescens, Prevotella bivia, Clostridium innocum, and then the inhibitory test is carried out, with two comparators ATCC (Streptococcus mutans as a comparison of Serratia marcescens and Clostridium Perfringens ascomparison of Clostridium innocum and Prevotella bivia).

Table.1 Test for bacteria *Prevotella bivia*, *Clostridium innocum* comparison with *Clostridium perfringens* (ATCC).

	Inhibitory Zone (mm)									
Bacteria	Ebp 20%	Ebp 40%	Ebp 60%	Ebp 80%	Garlic filtrate	Cresophene				
Prevotella bivia	0	0	0	0	51	36				
C. innocum	0	0	0	0	28	30				
C. perfringens	0	0	0	0	46	26				

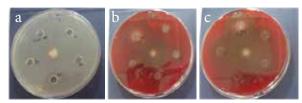


Figure 1. Test for bacteria. **(a)** *C. innocum, (b) <i>C. perfringens (ATCC),* **(c)** *Prevotella bivia.*

Tabel 2. Test for bacteria *Serratia marcescens* comparison with *Clostridium perfringens*(ATCC)

			Inhibitory Zone (mm)							
	No.	Bacteria	Ebp 20%	Ebp 40%	Ebp 60 %	Ebp 80%	Garlic filtrate	Cresophene		
	1.	S. marcescens	0	0	0	10	31	26		
	2.	S. mutans ATCC 35688	0	0	0	0	49	54		

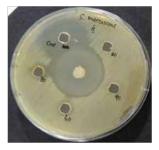




Figure2.Test for bacteria. (a) *Serratia marcescens*, (b) *S.mutans* ATCC 35688.

Discussion

In this research bacterial identification has been carried out Serratia marcescens, Prevotella bivia, Clostridium innocum from necrotic root canals of children aged 4-5 years and inhibition zone tests have been performed. The process of caries in deciduous teeth takes place very quickly, within six months caries can continue until the pulp tissue. 11 Penetration of bacteria into the pulp tissue can go through several ways, namely:open dentinal tubules, blood or lymphatic circulation, and crowns or roots of teeth on the pulp that were opened due to trauma, caries and preparation procedures. 12 Bacteri that diffuses through the pulp causing inflamation of the pulp until a root canal infection occurs.13 Inflamation in the untreated pulp can disrupt blood supply to the pulp which ultimately causes pulp necrosis.14 Bacteria found in infected root canals are very diverse in types and number. 15 One stage of root canal treatment in necrotic deciduous teeth is root canal sterilization. Root canal sterilization is done by irrigationand administration of medicament material. The medicament material serves to eliminate bacteria that cannot be destroyed by the process of instrumentation and irrigation.7Medical material that is often used is cresophene.¹⁶

Cresophene is one of the dentistry material which is widely used as root canal medicament before obturation. Cresophene contains parachlorophenol, dexamethasone, thymol, and camphor. Para monochlorophenol has a strong antibacterial, dexamethasone as an anti-inflammatory, thymol, and camphor as an antiseptic. Besides being a root canal sterilizer, cresophene is also often used as a deep cavity sterilizer. Paramonochlorophenol is the most content contained in cresophene by 30%.

Bacterial inhibition test results showed cresophene has inhibitory ability against the bacteria *Serratia marcescens, Clostridium innocum and Prevotella bivia*. Garlic extract of the variety "Tawangmangu

Baru" shows the results of inhibition against bacteria Serratia marcescens. As for the bacterium, Clostridium perfringens donot showed inhibitory results in most concentrations of garlic extract. Cresophene and garlic extract had inhibitory properties against S. mutans. Test for Prevotella bivia bacteria shown that cresophene has a greater inhibition than garlic extract, but it is lower than garlic filtrate. Garlic processed into filtrate also shows the results of inhibition against bacteria Clostridium innocum, Clostridium perfringens, Serratia marcescens, S.mutans and Prevotella bivia.

From the results of research on cresophene inhibitory test showed the inhibitory of all bacteria, garlic in extract form only has inhibitory properties against some bacteria and in certain concentrations while garlic made in the form of juice shows inhibition against bacteria Prevotella Clostridium innocum, Clostridium perfringens, Serratia marcescens and S. Mutans. The inhibitory test results are in accordance with several studies of cresophene antibacterial power. Research by Kalchinov et al. (2009) shows cresophene can inhibit the growth of bacteria isolated from carious lesions are E. faecalis, Staphylococcus aureus, Prevotella bivia. 17 Study of Ashhan et al. (2009) showed that cresophene with a dose of 15 µl more provides antibacterial power against streptococcus salivarius (39 mm), Streptococcus pyogenes (38mm), E.Coli (30mm), Staphylococcus aureus (28 mm) dan E. faecalis (26 mm). Anggono's research (2017) which was obtained from a comparison between black cumin oil, cresophene, Ca(OH), got the result that the antimicrobial effect that has the most potential against Staphylococcus aureus is cresophene. 18 One of the active substances contained in

cresophene as an antimicrobial besides phenol is tymol. Thymol can kill microbes effectively. Thymol is believed to kill gram-positive and gram-negative bacteria. Previous studies have suggested that cresophene is thought to be antimicrobial, besides it also contains parachlorophenol, dexamethasone, thymol, and camphorparamonochlorophenol. The results of this study support the statement of previous studies which mentioned that acresophene has a fairly good antibacterial ability.¹⁷ The way cresophene works is the same as other phenol groups, namely denaturing pathogenic germ proteins in the root canal.19

Conclusion

There were inhibitory bacteria in all study groups. Cresophene has a greater inhibition than garlic extract, but it is lower than garlic filtrate.

Ethical clearance

The study protocol was accepted and approved by the Ethics and Advocacy Commission of the Faculty of Dentistry, UGM, Yogyakarta, Indonesia.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this study.

Author's contribution

All authors have involved in whole stages of publication and also contributed for data analysisuntil publication process.

Acknowledgment

The author would like to thank the Faculty of Dentistry University Gadjah Mada, Yogyakarta, to the lecturers who have guided and helped, as well as to all those who have helped with this research process that the authors cannot mention one by one.

References:

- Sri Kuswandari, 2006, Profil Kesehatan Gigi Anak Pra-Sekolah di Kota Yogyakarta, MajalahKedokteran Gigi, 13(2), h. 131-136.
- Waterhouse, P.J, Nunn, J.H., Whitworth, J.M., 2000, An Investigation of the Relative Efficacy of Buckley'sFormocresoland Calcium Hydroxide in Primary Molar Vital Pulp Therapy, *Br Dent J*;188: p. 32-6.
- 3. Karguland Kadir, T., 2001, The Antibacterial Effects of Ornidazole on Primary Molars with Infected Pulps Chemotherapy, *J. Chemotherapi*; 7(3): 203-207.
- 4. Pediarahma A., Rizal, M.F.,2014, Zink Oxide Eugenol -Formokresol Root Canal Treatment Fails to Treat a Deciduous Tooth with Dentoalveolar Abses. *JDI*; 21 (3), h. 100-104
- Michel, A.K., Tuan H. Nguyen, Chogle, S., 2003, Antimicrobial Activity of Endodontic Sealers on Enterococcus faecalis, *JOE.*, 29(4): p. 257-8.
- Bahrololoomi, Z. and Zamaninejad, S.,2015, Success Rate of Zinc Oxide Eugenol in Pulpectomy of Necrotic Primary Molars: A Retrospective Study, J Dent Mater Tech.; 4(2): p. 89-94.
- 7. Torabinejad, M. and Walton, R.E., 2009, Principle and Practice of Endodontic, 4th Ed., Philadelphia: WB Saunders Company, p.1, 7,21, 28,38-40,49-50.
- 8. Harty, F.J., 1993, Clinical Endodontic (Trans), 3rded, Jakarta: Hippocrates; p. 159-83.
- 9. H. Ayhan et al, 2009, Antimicrobial Effects of Various Endodontic Irrigantson Selected Microorganisms, *International Endodontic Journal* (32): p. 99-102.
- 10. Blania, G., Spangenberg, B., 1991, Formation of

- Allicin From Dried Garlic (*Allium Sativum*): A Simple HPTLC Method for Simultaneous Determination of Allicin and Ajoene in Dried Garlic And Garlic Preparations. *Planta Med.*, 57:371-5.
- 11. McDonald, R.E. dan Avery, D.R., 1974, Dentistry for the Child and Adolescent, 2nd ed., Mosby Co., St. Louis, p. 146-168.
- Grossman, L.I., dan Olet, SS., 1995, Ilmu Edodontik dalam Praktek, ed.11 (terj.), EGC, Jakarta, h. 257, 196-282, 287-289.
- 13. Love, R.M., dan Jenkinson. H.F., 2002, Invasion of Dentinal by Oral Bacteria, International and American Association for Dental Research, 13(2): p 171-183
- 14. Andlaw, R.J., dan Rock, W.P., 1992, Perawan Pulpa Gigi Susu, Edisi 2 (Terj.), Widya Medika, Jakarta, h. 93-115.
- Seltzer, S.S., 1988, Endodontology, Biology Consideration in Endodontic Procedures, 2nd ed., Lea and Febiger, Philadelphia, p. 237-280.
- 16. Zehnder, M., 2006, Root Canal Irrigation, *J. Endodontic*, 32: 389-398.
- 17. Kalvinoc, 2009, In Vitro Study of Bactericidal Effect of Antimicrobial Agents Used in ModernEndodontics, *J of IMBA Annual Proceeding (Scientific Paper)*, p. 79-83.
- 18. FajarDwi Anggono,2017, Comparison of Antibacterial Activity Inhibitory of Black Cumin (*Nigella Sativa*) Oil, Cresophene®, and Calcium Hydroxide,*Padjadjaran Journal of Dentistry*;29(1):38-43.
- EndangSuhardjo dan W. Nasserie, 1975,
 PerananAntiseptikdalamPerawatanEndodontik,
 Naskah Forum Ilmiah II, FKG Usakti.