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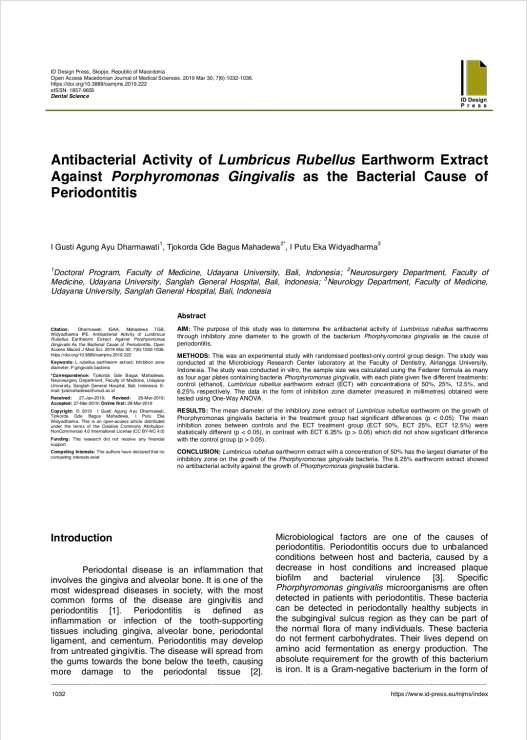

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Antibacterial Activity of *Lumbricus Rubellus* Earthworm Extract Against *Porphyromonas Gingivalis* as the Bacterial Cause of Periodontitis

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Keywords: *L. rubellus* earthworm extract; Inhibition zone diameter; *P. gingivalis* bacteria

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Abstract

AIM: The purpose of this study was to determine the antibacterial activity of *Lumbricus rubellus* earthworms through inhibitory zone diameter to the growth of the bacterium *Phorphyromonas gingivalis* as the cause of periodontitis.

METHODS: This was an experimental study with randomised posttest-only control group design. The study was conducted at the Microbiology Research Center laboratory at the Faculty of Dentistry, Airlangga University, Indonesia. The study was conducted in vitro, the sample size was calculated using the Federer formula as many as four agar plates containing bacteria *Phorphyromonas gingivalis*, with each plate given five different treatments; control (ethanol), *Lumbricus rubellus* earthworm extract (ECT) with concentrations of 50%, 25%, 12.5%, and 6.25% respectively. The data in the form of inhibition zone diameter (measured in millimetres) obtained were tested using One-Way ANOVA.

RESULTS: The mean diameter of the inhibitory zone extract of *Lumbricus rubellus* earthworm on the growth of *Phorphyromonas gingivalis* bacteria in the treatment group had significant differences ($p < 0.05$). The mean inhibition zones between controls and the ECT treatment group (ECT 50%, ECT 25%, ECT 12.5%) were statistically different ($p < 0.05$), in contrast with ECT 6.25% ($p > 0.05$) which did not show significant difference with the control group ($p > 0.05$).

CONCLUSION: *Lumbricus rubellus* earthworm extract with a concentration of 50% has the largest diameter of the inhibitory zone on the growth of the *Phorphyromonas gingivalis* bacteria. The 6.25% earthworm extract showed no antibacterial activity against the growth of *Phorphyromonas gingivalis* bacteria.

Introduction

Periodontal disease is an inflammation that involves the gingiva and alveolar bone. It is one of the most widespread diseases in society, with the most common forms of the disease are gingivitis and periodontitis [1]. Periodontitis is defined as inflammation or infection of the tooth-supporting tissues including gingiva, alveolar bone, periodontal ligament, and cementum. Periodontitis may develop from untreated gingivitis. The disease will spread from the gums towards the bone below the teeth, causing more damage to the periodontal tissue [2]. Microbiological factors are one of the causes of periodontitis. Periodontitis occurs due to unbalanced conditions between host and bacteria, caused by a decrease in host conditions and increased plaque biofilm and bacterial virulence [3]. Specific *Phorphyromonas gingivalis* microorganisms are often detected in patients with periodontitis. These bacteria can be detected in periodontally healthy subjects in the subgingival sulcus region as they can be part of the normal flora of many individuals. These bacteria do not ferment carbohydrates. Their lives depend on amino acid fermentation as energy production. The absolute requirement for the growth of this bacterium is iron. It is a Gram-negative bacterium in the form of