

Earthworm Extract *Lumbricus Rubellus* and *Pheretima* SP Against *Salmonella Typhi* and *Staphylococcus Aureus* Bacteria: A Literature Review

Wahyuni Nasution¹, Ali Napiah Nasution¹, Sri Lestari Ramadhani Nasution¹

¹Faculty of Medicine Universitas Prima Indonesia, Medan Indonesia

Abstract. *The aims of the study is to discusses Earthworm Extract Lumbricus Rubellus and Pheretima Sp Against Salmonella Typhi and Staphylococcus Aureus Bacteria. Antibacterial measurements showed that the ethylacetate fraction showed the strongest inhibition zone when compared to the ethanol extract against Salmonella typhi. The biochemistry of earthworm extract is also useful for improving the nervous system. The administration of Lumbricus earthworms extract can increase the regeneration of damaged nerve cells. The content of the earthworm Lumbricin-I can be used as an antibacterial. Morphological and morphological observations showed changes in Staphylococcus aureus bacteria exposed to extracts of marine worms Nereis sp.*

Keywords: *Lumbricus Rubellus, Aureus Bacteria, Earthworm Extract*

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INTRODUCTION

Lumbricus rubellus is a large number of animals in Indonesia; this worm typically lives in the muck of rice fields, garden soil, and so on; individuals who enjoy gardening are probably familiar with this one animal. This earthworm prefers wet environments, more precisely those that are shaded from the sun, and has a loose and moist soil structure. This ecosystem is ideal for the growth and development of these worms since the worm's body contains mucus that protects it, but it is repulsive to certain humans. For a long time, earthworms have been used as a medicine to treat a variety of diseases and to improve the immune system. Even when medical research advances, the use of earthworms retains greater importance in the hearts of the public because it has no adverse effects and is non-toxic.

Additionally, earthworms have proteases that serve as anticoagulants or disintegrate fibrin clots. As demonstrated in the study by Cho et al. (2004), who purified and characterized six lumbrikinase fractions for use as fibrinolytic agents. The earthworm *Lumbricus rubellus* can be used to treat typhoid because it contains the active ingredient Lumbricin 1, which is a typhoid fever medication. Lumbricin 1, which is held by the earthworm *Lumbricus rubellus*, works by creating pores in the bacterial cell wall, exposing the bacterial cell's cytoplasm, interfering with the bacterial cell's function and ultimately causing death.

Aydogdu & Cotuk (2008) discovered that coelomic fluid from *Dendrobaena veneta* worms suppressed bacteria but not erythrocytes in vertebrates at low doses, suggesting that it could be utilized as an alternative medication. Additionally, earthworm powder is antifungal, as demonstrated by research conducted by Ansari and Sitaram (2011), which discovered that *Eisenia Fetida* earthworm powder was beneficial in treating fungal illnesses such as candidosis. *Salmonella typhi* is the pathogen that causes a variety of diseases in humans. *Salmonella typhi* is a pathogenic bacteria that causes typhoid fever, an acute infectious disease that affects the small intestine, namely the Peyer's patch (Winarsih et al., 2015). *Salmonella typhi* is a dangerous bacterial infection that can cause salmonellosis. The goal of this investigation was to assess whether or not *Salmonella typhi* germs were present in crispy fried chicken snacks sold in Mataram City's Pagesangan neighborhood. The descriptive method is used in this study. The populace is a purveyor of crunchy fried chicken bites. *Staphylococcus aureus* is a gram-positive cocci-shaped bacteria that is widely spread in nature. It is found in the axillae, inguinal and perineal areas, and anterior noses of humans. Around 25%-30% of humans have *Staphylococcus aureus* in their nasal cavity and on their skin (Soedarto, 2014).

Staphylococcus aureus has the potential to cause disease in humans and is considered pathogenic. Infected body tissues can cause disease with characteristic symptoms such as inflammation, necrosis, and abscess formation. *Staphylococcus aureus* infections can manifest themselves in the form of throat infections, pneumonia, meningitis, food poisoning, different skin diseases, and impetigo.

Salmonella typhi is one of the pathogenic bacteria that cause typhoid fever, a systemic infectious disease characterized by a persistent fever, bacteremia, and inflammation of the intestines and liver. Typhoid fever is a contagious disease that has been the leading health problem in underdeveloped and tropical countries such as Southeast Asia, Africa, and Latin America for decades.

Inhibitory Power of *Lumbricus Rubellus* Earthworm Against *Salmonella Typhi* Bacteria

The purpose of this study is to ascertain the inhibitory effect of *Lumbricus rubellus* earthworm powder on *Salmonella typhi* bacteria. According to observations and measurements, the results indicated that *Lumbricus rubellus* earthworm powder had an excellent and relatively effective ability to prevent the growth of *Salmonella typhi* bacteria. This is demonstrated in the inhibition test by the creation of a clear zone around the paper disc implanted in the culture media. According to Yudha (2013), the clear zone is a sample diffusion area that shows an area of bacterial growth inhibition. The diameter of the inhibition zone created can be utilized to determine the extract's antibacterial potency.

According to Nurjanah (2018), the study's findings indicated a substantial difference between the control and treatment groups. This reveals that earthworm extract has antibacterial action against *Salmonella typhi* bacteria, with the lowest inhibition level occurring at a concentration of 0.26 percent and the maximum inhibition zone occurring at a concentration of 0.52 percent with a diameter of 8mm.

According to Dian Laila's 2010 research, there was no significant difference in the interaction of treatment with different types of worm flour and processing temperature variations. The type of worm meal demonstrated that *lumbricus rubellus* species were superior to and considerably different from *pheretima aspergillum* in forming inhibitory zones. Today, to facilitate treatment with earthworms, a powder/flour medication is

prepared using the earthworm's basic constituents. However, inaccuracies in species selection and processing temperature will result in low-quality worm flour capable of surviving *Salmonella typhi* bacteria disruption (Purwaningroom, 2010).

When compared to antibiotics such as chloramphenicol as a positive control, earthworm powder was found to be effective at inhibiting *Salmonella typhi* bacteria. While the positive control Chloramphenicol was able to limit the development of *Salmonella typhi* bacteria, it was classified as a Strong inhibitor according to the inhibition zone value of 20. The higher the concentration, the wider the inhibition zone generated by *Lumbricus rubellus* earthworm powder against *Salmonella typhi* bacteria development.

Pheretima Sp Inhibitory Against Salmonella Typhi Bacteria

Research Ratriyani (2000). The chloroform extract of the earthworm *Pheretima* sp contains an alkaloid component that formed a white precipitate when subjected to a phytochemical screening test. This is a scientific experiment using extracts of *Lumbricus rubellus* and *Pheretima* sp. as samples. The research is experimental in nature and employs a post-test only group control strategy. After treatment, the dependent variable was the number of *Salmonella typhi* colonies. The experimental design utilized a three-factorial randomized design with Janis earthworms *Lumbricus rubellus* and *Pheretima* sp, a contact time of 12, 24 hours, and earthworm concentrations of 32%, 16%, 8%, and 4% as treatments. The ANOVA test was performed to establish *Salmonella typhi*'s sensitivity to the earthworm extract employed, and Duncan's Multiple Test was used to identify whether treatment combinations were significantly different. The biochemical and molecular biology processes involved in the healing of acute infectious disorders, from the onset of inflammation to perporation in typus abdominalis generated by endogenous pyrogens from the bacteria *Salmonella typhi*, are a complicated and dynamic mechanism.

Numerous cytokines are involved in this process, including interleukin six (IL-6) and fibroblast growth factor-2 (FGF-2). Chemical agents, surgery, and natural therapies are used in the treatment. Commercial patent medications are manufactured chemically, whereas perporation is performed surgically. The community utilizes two earthworm species, *Lumbricus rubellus* and *Pheretima javanica*. The goal of this study was to ascertain the mechanism of action of two earthworm species that were circulating in the market: earthworm complex lipoprotein extract, earthworm infusion, dried earthworms, and capsule earthworms. Antibacterial assays revealed that as compared to the ethanol extract, the ethylacetate fraction exhibited the highest inhibitory zone against *Salmonella typhi*. At the same concentrations of 400 and 500 mg/ml, ethylacetate inhibited by 13.94 and 16.76 mm, respectively, whereas the ethanol fraction inhibited by only 12.76 and 14.66 mm. According to Davis and Stout (1971), a drug is regarded to be effective if its zone of inhibition is greater than 10 mm. According to the findings of the tests, the ethyl acetate fraction and ethanol extract were successful at preventing the development of *Salmonella typhi* bacteria, however the n-Hexane fraction exhibited no antibacterial activity (Syifa Qolbina, 2020). Earthworms have the ability to improve Schwann cell signaling pathways. These are the cells that play a critical role in the repair of injured nerves. Another advantage of earthworms is that their biochemistry is beneficial for the neurological system. The injection of *Lumbicus* earthworm extract has been shown to enhance nerve cell regeneration. However, these findings warrant further investigation. *Salmonella typhi* is a gram-negative bacteria that infects people and produces typhoid

fever. Fever treatment Along with synthetic antibiotics, worm-derived antibiotics can be used. For a long time, it was recognized that worms might be used as medicine to treat a variety of ailments. Antibacterial chemicals found in worms can be extracted using an ethanol solvent.

Earthworm *Lumbricus Rubellus* against *Staphylococcus Aureus*

Antibiotics can be used to treat abscesses. However, when chemical antibiotics are used inappropriately, they produce side effects and the emergence of resistance. People are becoming more receptive to using medications made from natural substances and traditional treatments such as earthworms. Lumbricin-I, a compound found in earthworms, can be employed as an antibiotic. Earthworms have long been used in medicine to cure a variety of ailments and to increase physical endurance. Despite medical science's advancement, individuals prefer the use of earthworms since they have no side effects or hazardous effects. *Salmonella thyphi* culture at 50%, 75%, and 100% concentrations resulted in averaged diameters of inhibition zones of 7.61.9mm, 8.51.3mm, and 11.60.9mm, respectively, and statistical analysis revealed a p -value = 0.000 ($p < 0.05$), whereas averaged inhibition zones for *Staphylococcus aureus* at 50%, 75%, and 100% concentrations were 3.90.6mm, 4.81mm, 5, 8mm1.1mm, respectively, and statistical analysis revealed It was, however, less successful than positive control. In vitro, earthworm (*Lumbricus rubellus*) extract showed antibacterial action against *Salmonella thyphi* at concentrations ranging from 50% to 100% and against *Staphylococcus aureus* at concentrations ranging from 25% to 100%. F. S. M. Mulyatno & R. Sintowati (2017). Earthworm (*Lumbricus rubellus*) extracts at concentrations ranging from 50% w/v to 100% w/v were shown to suppress the growth of *Salmonella thyphi* and *Staphylococcus aureus* bacteria. The morphology of *Staphylococcus aureus* bacteria exposed to extracts of marine worms *Nereis* sp., earthworms *Lumbricus rubellus*, and earthworms was observed using a light microscope at a magnification of 100 times and morphological observations using a Scanning Electron Microscope (SEM) at a magnification of 15,000 times. *Eisenia foetida*. *Eisenia foetida*. It is prudent to do additional studies to identify the expected chemicals found in the ethanolic extracts of the sea worm *Nereis* sp., the earthworm *Lumbricus rubellus*, and the earthworm *Eisenia foetida* (Ningrum, 2017).

Pheretima* Sp against *Staphylococcus Aureus

The zone of inhibition narrows, indicating that it is bacteriostatic in nature. Additionally, qualitative testing using the phytochemical screening method was used to confirm the chemicals found in the earthworms. The results indicated that the chloroform extract of the earthworm *Pheretima* sp. contained alkaloids (Yuniati, 2012). Gram-positive bacteria such as *Staphylococcus aureus* and Gram-negative bacteria such as *Vibrio cholerae* produce infections that affect the human body. On the skin, lungs, kidneys, and bones, *Staphylococcus aureus* can cause diarrhea, rashes, and ulcers. The bacteria *Vibrio cholerae* are prevalent in the urinary tract and digestive tract and are responsible for diarrhea and cholera (Brooks et al, 2001). Secondary metabolite compounds are a class of chemical molecules with antibacterial and antiviral activity. Antibacterial compounds function by damaging the bacteria's anatomy in a variety of ways. Phenolic chemicals and their derivatives are antibacterial agents that work by impairing the cytoplasmic membrane's function. Nasution and Wahyuni conducted research (2020). Infections disease is a significant source of morbidity and mortality in Indonesia, and is typically caused by *Salmonella typhi* and *Staphylococcus aureus*

bacteria. Treatment of infectious diseases with uncontrolled antibiotics can result in resistance. Thus, people can make use of traditional treatments such as *Lumbricus rubellus* and *Pheretima* sp earthworms. This article discussed how efficient it is at inhibiting *Salmonella typhi* and *Staphylococcus aureus* by eliciting a strong inhibitory response. The results were examined using the One Way ANOVA test, and a value of $p=0.0000.05$ was obtained. As a result, the effect of the *Lumbricus rubellus* and *Pheretima* sp extracts on *Salmonella typhi* and *Staphylococcus aureus* were demonstrated. Infection with *Staphylococcus aureus* is an infection caused by the bacterium *Staphylococcus aureus*.

Simbolon Investigations (2020) The inhibitory diameter measurements revealed that the ethylacetate fraction had the strongest antibacterial activity when compared to the ethanol extract in suppressing bacterial growth. *Staphylococcus aureus* and *Vibrio cholerae* grew to 22.26 mm and 21.86 mm in ethylacetate fractions, respectively, while bacteria grew to 22.03 mm and 19.23 mm in ethanol extract at a concentration of 400 inhibitory diameter.

Although this bacteria is a member of the genus *Staphylococcus*, it is the most frequently encountered cause of illness. This species of bacterium is frequently discovered on the skin or in the nose of humans. According to Jannah (2018), *Staphylococcus aureus* infections have increased globally during the last two decades. In the United States and Europe, *Staphylococcus aureus* is the most frequent bacterial pathogen causing infection, with a frequency of 18-30%, however in Asia, *Staphylococcus aureus* and *Pseudomonas aeruginosa* have nearly identical infection rates.

CONCLUSION

Inhibitory Power of *Lumbricus Rubellus* Earthworm Against *Salmonella Typhi* Bacteria. Today, a powder/flour drug is made with the basic ingredients of earthworms. The diameter of the inhibition zone formed can indicate the antibacterial strength of the extract used. This research is a laboratory experiment with samples in the form of extracts of *Lumbricus rubellus* and *Pheretima* sp. Antibacterial measurements showed that the ethylacetate fraction showed the strongest inhibition zone when compared to the ethanol extract against *Salmonella typhi*. The biochemistry of earthworm extract is also useful for improving the nervous system. The administration of *Lumbricus* earthworms extract can increase the regeneration of damaged nerve cells. The content of the earthworm Lumbricin-I can be used as an antibacterial. Morphological and morphological observations showed changes in *Staphylococcus aureus* bacteria exposed to extracts of marine worms *Nereis* sp., earthworms *Lumbricus rubellus* and earthworms. The zone of inhibition decreases so that it is said to tend to be bacteriostatic. Indonesian traditional medicines *Lumbricus rubellus* and *Pheretima* sp earthworm can inhibit the growth of *Salmonella typhi* and *Staphylococcus aureus* bacteria. Ethylacetate fraction showed the strongest antibacterial activity compared to ethanol extract in inhibiting bacterial growth.

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