I. INTRODUCTION

1.1 Background

Diarrhea and dysentery are still public health problems in many developing countries, including Indonesia. According to the Indonesian Health Profile 2020 by Kementerian Kesehatan Republik Indonesia, diarrheal disease is an endemic disease that has the potential to cause Kejadian Luar Biasa (KLB) and is still a contributor to mortality in Indonesia, especially in toddlers. Bacteria that cause diarrhea and dysentery in humans include *Escherichia coli* and *Shigella dysenteriae* (Aini, 2017). Diarrhea or acute gastroenteritis is loose stools in liquid form more than three times a day and lasts for two days or more. Diarrhea will cause the sufferer to lose several body fluids and electrolytes. Dehydration experienced ranges from mild to severe dehydration, some even resulting in death. Diarrhea is caused by *Escherichia coli* bacteria which transmit diarrhea through contaminated food. Meanwhile, dysentery is a disease of the gastrointestinal tract in which the stool is known to contain blood with or without mucus. Blood usually comes from a wound in the wall of the digestive tract, which is usually from the wall of the large intestine. The cause of dysentery is the bacterium *Shigella dysenteriae* which spreads to contaminated food and drink. Shigella bacteria that enter the digestive organs will cause swelling to cause injury and inflammation of the colon wall (Ardinasari, 2016).

Diseases caused by bacteria such as diarrhea and dysentery can be treated using modern or synthetic drugs. The use of synthetic drugs in the treatment of diarrhea is grouped into several categories, namely antimotility, adsorbents, anti-

secretions, antibiotics, and intestinal microflora. Synthetic drugs often cause side effects. The most common side effects are abdominal pain, nausea, vomiting, dry mouth, drowsiness, and dizziness (Mulyani *et al.*, 2021). Apart from causing side effects, the use of these synthetic drugs can also cause resistance to microorganisms (Aini, 2017). In addition, traditional medicine is still widely used by the community at large, both in rural and urban areas. Traditional medicine is preferred because it is considered to have relatively small side effects. Traditional medicine and modern medicine still have side effects, but if the two are compared, the side effects of traditional medicine are still smaller than the side effects of modern medicine if they are used correctly. As this awareness increases, more and more scientific research is directed at natural ingredients. One of the plants used in traditional medicine is coconut (Mulyani *et al.*, 2021).

Coconut (*Cocos nucifera* Linn) is a tall plantation plant of the palmae family, with straight, and unbranched stems. Coconut trunk height can reach 30 m, with a trunk diameter of 20-30 cm. Coconut leaves have even fins and parallel bones. Leaves have leaf sheaths, where there are leaf children on the left and right sides. The coconut flower is a coral flower known as Mayang or manggar. The fruit is a stone fruit with seeds that have small bodies and a large endosperm (Angelia, 2014). Coconut trees have roots that grow under the surface. These roots reach as far as the height of the tree (Fuaddah, 2020). Indonesia is the largest coconut-producing country in the world with an area of around 3.8 million hectares of coconut land which produces around 16.3 billion coconuts per year (Simpala, 2017). Coconut itself is a multi-purpose plant that is commonly found on all Indonesian islands. There is no part of the coconut that cannot be used. Roots, stems, leaves, stems, tree

bark, fruit flesh, coconut water, shell, and husks can be used for many things (Swatika, 2014).

Traditionally, people have used coconut plants as medicine. Coconut leaf decoction can be used to treat vomiting. Consuming coconut flesh can treat intestinal worms. Coconut water is used as an antidote, for fever and urinary tract disorders. Boiled coconut roots are used to treat sore throats (Dalimartha, 2008, *cit*. Mulyani 2018). Apart from that, coconut roots are also used by the community as a medicine to treat diarrhea (Maulana, 2022) and coconut root infusions are used to cure dysentery (Riono *et al*., 2022). This is because the coconut plant is a potential source of phytochemical components. These phytochemical compounds exist in certain parts of the plant rich in phenolic, alkaloid, terpenoid, and steroid compounds which are generally found in roots, stems, twigs, and leaves (Katja *et al*., 2008). In addition, coconut roots contain tannins (Arifandi, 2018). Tannins are compounds that have antibacterial potential by inhibiting the reverse transcriptase and DNA topoisomerase enzymes so that bacterial cells cannot form (Noventi, 2016).

Based on this background, this study aims to test the antibacterial effectiveness of coconut root extract against *Escherichia coli* and *Shigella dysenteriae* bacteria using extract concentrations of 25%, 50%, 75%, and 100%. This research is expected to become a scientific basis for the development of coconut root as a herbal medicine for the treatment of diarrhea and dysentery.

1.2 Problem Formulation

The problems in this study are as follows:

1. Can coconut root extract (*Cocos nucifera* Linn) inhibit the growth of *Escherichia coli* and *Shigella dysentriae* bacteria?
2. What are the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of coconut root extract (*Cocos nucifera* Linn) against *Escherichia coli* and *Shigella dysentriae* bacteria?

1.3 Research Objective

In answering the problems that have been formulated above, the purpose of this study is as follows:

1. To find out whether coconut root extract (*Cocos nucifera* Linn) can inhibit the growth of *Escherichia coli* and *Shigella dysentriae* bacteria.
2. To determine the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of coconut root extract (*Cocos nucifera* Linn) against *Escherichia coli* and *Shigella dysentriae* bacteria.

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1.4 Benefits of Research

The benefits derived from this research are:

1. For researchers, this research is a means of conveying ideas about the field of science that is occupied.

2. For society, the results of this research can be used as a scientific basis for the use of coconut roots as a herbal medicine for diarrhea and dysentery.

3. For university, this research is in accordance with the vision and mission of the Department of Biology FMIPA Andalas University in terms of society service and utilization of biological resources.

4. For the government, this research is to provide innovation and alternatives in compiling development programs that suit the needs of the society.

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