

# CHAPTER I

## INTRODUCTION

### 1.1. Background

Skin microbiota or normal skin microbes are populations of microorganisms that live in the skin or human mucous membranes. This microbiota has a role as the first defence in the face of microbial pathogens, help the digestive process, play a role in the degradation of toxins and contribute to the maturation of the immune system. Microorganisms that belong to the normal flora can be grouped into 2 groups, namely resident flora and transient flora (Brooks, 2012). Resident flora is a normal flora that is permanent. If they are in the right place and under normal or uninterrupted conditions, they will not cause disease or even benefit (Suharto, 2010). However, if normal flora gets disturbed, it will cause diseases such as infection. The term infection describes the growth or replication of microorganisms in the host body. The disease will arise if the infection produces changes in the body's normal physiology (Pratiwi, 2008).

Some bacteria that can cause infection are *Staphylococcus aureus*, *Propionibacterium acnes*, *Mycobacterium*, and *Staphylococcus epidermidis* (Suharto, 2010). *Staphylococcus epidermidis* is a gram-positive bacteria and can form white colonies. This bacterium has habitat on the skin and mucous membranes, usually transmitting through the hands (Irianto, 2013). *Staphylococcus epidermidis* can cause opportunistic infection, an infection that occurs when a person's immune system is weak. The decreased immune system can be caused due to HIV/AIDS, severe burns, immunosuppressant drug therapy, chemotherapy, diabetes to cancer such as leukaemia. These causes can trigger opportunistic infections (Pratiwi, 2008). This infection is very dangerous for people who have HIV/AIDS because it can cause death.

In general, infections can be treated using antibiotics. At present some bacteria are starting to be resistant to antibiotics due to their overuse.

As a solution to overcome antibiotic resistance, people turn to alternative medicine by using plants that have medicinal properties. Allah SWT has created nature and everything in it as a mercy for all mankind. Humans have the right to make the most of the available natural resources. Indeed, of all God's creations, many benefits that can be used by humans if they think. As the word of Allah SWT :

أَوَلَمْ يَرَوْا إِلَى الْأَرْضِ كَمْ أَنْبَتْنَا فِيهَا مِنْ كُلِّ زَوْجٍ كَرِيمٍ ﴿٧﴾ إِنَّ فِي ذَلِكَ لَآيَةً وَمَا كَانَ أَكْثَرُهُمْ مُؤْمِنِينَ ﴿٨﴾ الشعراء [٢٦] : ٧-٨

*Meaning: " And don't they care about the earth, how much We have grown on the earth a great variety of good plants? Indeed there is indeed a sign of the power of God. And most of them don't believe." (Asy-Syu'araa [26]:7-8)*

The above verse explains that God grows a variety of good plants, namely fertile and beneficial plants. In Indonesia, many plants can be used as medicinal materials such as tea plants. Tea is a species of plant whose leaves and shoots are used to make tea (Agoes, 2010). Based on post-harvest handling, tea can be classified into 5 (five) types, namely white tea, green tea, black tea, oolong tea and jasmine tea (Gardjito & Rahadian, 2011).

Green tea has good benefits for human health. The main ingredients in tea are 30-35% polyphenols, the rest are 25% carbohydrates, 3.5% caffeine, 15% protein, 4% amino acids, 6.5% lignin, 1.5% organic acid, 2% lipid, chlorophyll 0.5%, carotenoids less than 0.1% and volatile compounds 0.1% (Fauzia, 2014). Polyphenols which are the most compounds in tea have sub-classes namely flavones, flavonols, flavanones, anthocyanidins, isoflavones and catechins. Catechins in green tea leaves contain more than the catechins in black tea (Gardjito & Rahadian, 2011). This is because of the levels of catechin compounds which are derivatives of these polyphenol compound influenced by the level of fermentation and heating of tea leaves during the manufacturing process (Jigisha, 2012). Catechin compounds have a role as an anti-inflammatory, anti-cell replication, anti-aggregation, reducing LDL

cholesterol levels and also as an antibacterial (Gardjito & Rahadian, 2011).

According to research conducted by Herwin et al (2018), green tea leaves and pulp extracted using ethanol 96% had antibacterial activity against *Propionibacterium acne* and *Staphylococcus epidermidis* with a Minimum Inhibitory Concentration (MIC) value of 0.1% and a Minimum Bactericidal Concentration value (MBC) value of 4%. The average inhibition zone diameter of green tea leaves was 18.11 mm against *Propionibacterium acne* and 18.05 mm against *Staphylococcus epidermidis* while the average inhibition zone diameter of green tea pulp was 17.45 mm against *Propionibacterium acne* and 15.68 mm against *Staphylococcus epidermidis*.

The content of compounds in green tea can be obtained by extraction using an appropriate solvent. The recommended solvent according to pharmacopoeia was aqueous ethanol. Different concentrations of ethanol can produce different antibacterial activities due to differences in the polarity of each solvent that affects the amount of compound taken. Based on research conducted by Denny (2014), differences in the concentration of solvents (ethanol 96%, 70% and 50%) used in soursop (*Annona muricata*. Linn) leaf extraction produce different antioxidant activities and enlarge the concentration of solvents does not necessarily increase its activity. This makes a basic consideration for the researcher to use variations in the concentration of solvents in extracting green tea. Therefore, the researcher intends to test the antibacterial activity of green tea ethanol extract (*Camellia sinensis*) against *Staphylococcus epidermidis* by using various solvent concentrations namely ethanol with concentrations of 90%, 80%, 70% and 60%.

## **1.2. Formulation of the Problems**

Based on the above background and in the effort to utilize green tea extract as a test subject for antibacterial activity against *Staphylococcus epidermidis*, the problem that can be formulated is :

1. Does the ethanol extract of green tea (*Camellia sinensis*) have antibacterial activity against the growth of *Staphylococcus epidermidis*?
2. What is the ethanol extract concentration of green tea (*Camellia sinensis*) that have the most optimal inhibitory ability?

### **1.3. Objectives of Research**

Based on the problem formulation above, the objectives of research are :

1. Knowing the presence of antibacterial activity in the ethanol extracts of green tea (*Camellia sinensis*) on the growth of *Staphylococcus epidermidis*.
2. Knowing the concentration of ethanol extracts of green tea (*Camellia sinensis*) which has the most optimal inhibitory ability against the growth of *Staphylococcus epidermidis*.

### **1.4. Benefits of Research**

#### 1.4.1. Theoretical Benefits

The results of the research are expected to be information in knowing the benefits of green tea ethanol extracts as a natural antibacterial that can inhibit the growth of *Staphylococcus epidermidis* and can be used as a reference in research on the ability of green tea as an antibacterial.

#### 1.4.2. Practical Benefits

The results of the study are expected to prove that the ethanol extracts of green tea is antibacterial against the *Staphylococcus epidermidis* bacteria and can be used by the community as an infectious drug caused by this bacterium.