CHAPTER I INTRODUCTION

1.1 Background

Ulcerative colitis is a chronic inflammatory disorder affecting the colon mucosa, characterized by recurring symptoms (Ordás *et al*., 2012). Ulcerative colitis (UC) is a part of inflammatory bowel disease (IBD). Ulcerative colitis is different from Crohn's disease. Crohn's disease (CD) is an inflammatory condition affecting the digestive tract from the mouth to the anus, with clinical symptoms including fever, abdominal pain, diarrhea, and the presence of blood or mucus or both. In contrast, UC typically causes continuous mucosal inflammation confined to the colon (De Souza, 2016). In 2019, an estimated 4.9 million cases of IBD were recorded globally, with the highest numbers found in China and the United States. In the U.S., about 1 in 100 individuals are affected by IBD, which includes Crohn's Disease and Ulcerative Colitis. This represents one of the highest prevalence rates globally (Wang *et al*., 2023). In the past two decades, the incidence of IBD has significantly increased in Asia, ranging from 3,1-4,2%. In the etiology of patients with chronic non-infectious diarrhea in Indonesia, prevalence of IBD in Indonesia is 1.16-26.5%, with UC accounting for 5.4-26.5% and CD for 1-10.2% (Ng *et al*., 2016).

According to Munkholm in 2006, patients with inflammatory bowel disease (IBD), including ulcerative colitis, have a higher risk of developing colorectal cancer (CRC). The colon remains the primary site of neoplasia in IBD patients today. Colorectal cancer accounts for about 10-15% of all deaths in IBD patients. Ulcerative colitis or IBD is an incurable disease. Therefore, the main goals of IBD therapy are to minimize symptoms, improve quality of life, prolong remission, and prevent complications (Sairenji, 2017). Administration of mesalazine suppositories or enemas is quite urgent for patients with UC

or IBD. However, in severe cases, it is usually insufficient (Firmansyah, 2013). Medications such as aminosalicylates have side effects like nausea, vomiting, heartburn, diarrhea, and headaches. Additionally, long-term corticosteroid side effects can include weight gain, acne, facial hair, hypertension, diabetes, and loss of bone mass (Podolsky, 2002).

Several studies have shown that other causes of ulcerative colitis (UC)) are also due to using non-steroidal anti-inflammatory drugs (NSAIDs), such as indomethacin (Podolsky, 2002). This is because indomethacin is able to inhibit the cyclooxygenase (COX) 1 enzyme, which functions on PGE2 synthesis and mucus production to protect the intestine mucosa from attack by bacteria and viruses that cause infection (Achkar, 2000 and Takeuchi, 2003). Apart from medicine, researchers are also trying to develop herbal therapies using plants that have potential as medicine in colitis. In previous studies, the ethanol and methanol extracts of Flo's Lonicera (tea type) and Rhizoma bastille methanol extract (orchid type), which are rich in polyphenols as antioxidants, can treat IBD (Wu, 2007; Wu *et al.*, 2010). Herbal therapy is usually safer than conventional medicine.

The use of natural ingredients to treat ulcerative colitis continues to grow and is widely trialed in recent research studies, especially for materials containing anti-inflammatory, antidiarrheal, and antioxidant properties. In Indonesia, the potential for the use of traditional medicines is enormous. It is known that there are around 5,131,100 species of medicinal plants in Indonesia (Kusuma, 2005). One of the plants that is widely used as a treatment is the leaves of paliasa (*Kleinhovia hospital* L.). Paliasa leaves are part of the plant that is widely used in traditional medicine. Meanwhile, other parts are very little used by the community. The tannin phytochemical test on the leaves and bark of paliasa showed positive results, indicating that the leaves of paliasa have the potential to be anti-inflammatory (Simbala, 2009).

Paliasa leaf extract (*Kleinhovia hospita* L.) can inhibit bacterial growth and cell lysis so that which affects the decrease in the secretion of proinflammatory cytokines such as TNF-α and IL-1β as a result of reduced activation of the immune system (Maulida &Husna, 2016). In addition, the tannins in paliasa leaf extract are also active compounds of secondary metabolites which are known to have several properties, including as astringents, antidiarrheals, antibacterials, and antioxidants (Desmiaty *et al*., 2008 in Malanggia *et al*., 2012). Compounds in paliasa leaves will decompose into pyrogallol, pyrocatechol, and phloroglucinol when heated to a temperature of 210ºF-215ºF (98.89ºC-101.67ºC). Pyrogallol has significant biological activity and antioxidant potential (Umaru *et al*., 2020)

Based on practical use and the content of active compounds, paliasa leaves *(Kleinhovia hospita* L) have bright prospects to be developed as anti-inflammatory herbs. This study aims to determine the content of antioxidant and anti-inflammatory compounds in paliasa leaf extract and to test the effect of paliasa leaf extract (*Kleinhovia hospita* L) on in vivo colonic mucosal repair in male Wistar rats induced by colitis.

1.2 Problem Formulation

1. Identification of the potential of active antioxidant and anti-inflammatory compounds contained in paliasa leaves (*Kleinhovia hospita* L.).
2. What is the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on the improvement of the morphology in terms of length, weight, and diameter of the colon in rats induced with colitis by 1% dextran sodium sulfate?
3. What is the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on the improvement of mucosal thickness and the number of goblet cells in the

histopathology of the colon mucosa in rats induced with colitis by 1% dextran sodium sulfate?

4. What is the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on the improvement of necrosis damage, inflammatory cell infiltration, epithelial integrity, and submucosal edema in the histopathology of the colon in rats induced with colitis by 1% dextran sodium sulfate?

1.3 Research Purpose

1. To determine the potency of active antioxidant and anti-inflammatory compounds contained in paliasa leaves (*Kleinhovia hospita* L.).
2. To determine the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on improving the morphology of the length, weight and diameter of the rat colon induced by colitis by inducing 1% sodium dextran sulfate?
3. To determine the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on improving mucosal thickness and the number of goblet cells in the histopathology of the colon mucosa of rats induced by colitis with 1% dextran sodium sulfate?
4. To determine the effect of administering paliasa leaf extract (*Kleinhovia hospita* L.) on improving necrosis damage, inflammatory cell infiltration, epithelial integrity, and submucosal edema in the histopathology of the colon of rats induced by colitis with 1% dextran sodium sulfate?

1.4 Benefits

As an additional insight and source of information, especially in the field of pharmacology of medicinal plants, especially regarding the use of paliasa leaves (*Kleinhovia hospita* L.) in overcoming colitis as an alternative therapy for colits that is effective in addition to chemical

drugs in the community. And paliasa leaves can be further processed to become basic ingredients for functional supplements.