I. INTRODUCTION

A. Backround

Consumption of high-fat diet has been known to be a major factor in obesity due to fat accumulation in the body and increases the risk of various metabolic diseases (Gao et al., 2015). In addition, obesity caused by high-fat diet intake has been reported to be associated with inflammatory bowel disease due to oxidative stress, increased inflammatory response and impaired intestinal barrier function (Szilagy, 2021; Chelakkot et al., 2018; Wang et al., 2020). Research has proven that high-fat diet intake can affect the intestine which plays an important role in the process of food absorption and a barrier against exogenous pathogens. This can be one of the causes of metabolic diseases and trigger local inflammation in the intestines and also systemic inflammation (Rohr et al., 2020; Sugimura et al., 2019; Monteiro-Sepulveda et al., 2015).

Dietary fiber supplementation has been known to overcome the effects of oxidative stress and inflammation due to consumption of high-fat diet (Jacobsdottir et al., 2013; Ghanim et al., 2017). The study of Salazar-Lopez et al. (2020) has proven that dietary fiber from sorghum rice can prevent dysregulation of lipid and sugar metabolism, inflammation and oxidative stress in obese mice induced by high-fat diet. Other studies have shown that dietary fiber from gum arabic can reduce oxidative stress and inflammation in the gastrointestinal tract of mice (Ali et al., 2020). Zhang et al. (2019) reported that dietary fiber can reduce intestinal lesions, oxidative stress and systemic inflammation in endotoxemic mice models. Besides that, the supplementation of dietary fiber from *Plantag ovata* has been

reported to provide protection to the intestinal mucosa from demage (Sahagún et al., 2015).

Efficacy of jicama (*Pachyrhizus erosus* L.) fiber on indicators of oxidative stress and inflammation in the intestine, intestinal histopathology, hematological profiles and their mechanism in inhibiting the inflammatory signaling pathway is not clearly known. Santoso et al. (2019) proved that jicama fiber can protect mice fed a high-sugar diet against metabolic diseases such as obesity and diabetes. In addition, jicama fiber has been reported to prevent the accumulation of free radicals as a marker of oxidative stress and macrophage infiltration in the liver of mice suffering from hyperglycemia (Santoso, 2021). Other studies have shown that jicama fiber can modulate the body's immune system (immunodulator) by regulating macrophage activity, antibody production, and pro-inflammatory cytokines both in vitro and in vivo (Kumalasari et al., 2013; Baroroh et al., 2020). Based on the results of GC-MS, jicama fiber has been identified to contain bioactive compounds that are thought to have antioxidant and anti-inflammatory activity Santoso et al. (2021).

The intestine is an organ that has a main function in the absorption of nutrients and plays an important role in maintaining the body's defense against external and toxic factors that enter the body (Judkins et al., 2020; Chelakkot et al., 2018). Intestinal homoestasis dysregulation due to consumption of high-fat diet can increase oxidative stress, trigger immune responses and cause degeneration of the intestinal organs (Rohr et al., 2020; Sugimura et al., 2019; Monteiro-Sepulveda et al., 2015). Malondialdehyde (MDA) is one of the main indicators of lipid

peroxidation due to accumulation of free radicals in cells (Ayala et al., 2014). MDA levels have been reported to be inversely related to endogenous antioxidants such as catalse during high-fat diet intake, so that the body cannot optimally neutralize free radicals during oxidative stress (Zhang *et al.*, 2017). Consumption of high-fat diet has also been reported to cause inflammation and trigger abnormalities in the hematological profile (Purdy and Shatzel, 2021).

Molecular docking studies are an in silico method that can be used to help identify and design new drugs and select the most effective drug candidates against certain diseases before being tested further (Boopathi et al., 2020). Molecular docking aims to tether two molecules, namely ligands and macromolecules to form a stable conformation so that the ability of the ligand to inhibit or activate a macromolecule can be predicted in an effort to analyze the potential of a compound (Dar and Mir, 2017).

Therefore, this study aims to identify the efficacy and mechanism of action of jicama fiber on the development of obesity due high-fat diet intake in counteracting oxidative stress in intestine, preventing morphological and histological demage of intestine, stabilizing hematological profile and analyzing the ability of bioactive compound in jicama fiber as anti-inflammatory trough molecular docking.

Based on the background that has been described, it is very necessary to conduct research to clarify the effect of jicama fiber on MDA levels and catalase activity in the intestine, intestinal histopathology and hematological profiles of mice fed high-fat diet and also a molecular docking study on the ability of jicama fiber in overcoming inflammation. The efficacy of jicama fiber that will be found in this

study is expected to be an effective and economical solution in overcoming oxidative stress, inflammation, intestinal degeneration and abnormality of hematological profiles in the development of obesity due to consumption of high-fat diet.

B. Formulation of The Problem

1. How is the effect of supplementation jicama tuber fiber in high-fat diet on indicators of oxidative stress including MDA levels and catalase activity in the intestine of mice?
2. How is the effect of supplementation jicama tuber fiber in high fat diet on the intestinal histopathology and inflammation of mice?
3. How is the effect of supplementation jicama tuber fiber in high-fat diet on indicators of inflammation in the blood of mice including a hematological profile such as values of leukocytes, erythrocytes and platelets?
4. How is the ability of the bioactive compounds in jicama tuber fiber to inhibit the activation of the inflammatory signaling pathway based on molecular docking simulation?

C. Purposes of The Research

1. To analyze the effect of supplementation jicama tuber fiber in high-fat diet on indicators of oxidative stress including MDA levels and catalase activity in the intestine of mice.
2. To analyze the effect of supplementation jicama tuber fiber in high fat diet on

the intestinal histopathology and inflammation of mice.

3. To analyze the effect of supplementation jicama tuber fiber in high-fat diet on indicators of inflammation in the blood of mice including a hematological profile such as values of leukocytes, erythrocytes and platelets.
4. To analyze ability of the bioactive compounds in jicama tuber fiber to inhibit the activation of the inflammatory signaling pathway based on molecular docking simulation.

D. Hypothesis of The Research

1. The supplementation of jicama tuber fiber in high-fat diet can maintain a balance between MDA levels and catalase activity in the intestines of mice.
2. The supplementation of jicama tuber fiber in high-fat diet can prevent histophatological alteration and inflammation of the intestines of mice.
3. The supplementation of jicama tuber fiber in high-fat diet can prevent the increase of inflammatory indicators in the blood of mice.
4. Bioactive compounds in jicama tuber fiber have the potential to inhibit the activation of inflammatory signaling based on molecular docking simulation.

E. Benefit of The Research

The results of this study are expected to be used as a source of information for the public regarding the efficacy of jicama fiber in preventing the development of obesity, especially oxidative stress, inflammation, intestinal histopathology and abnormality of hematological profiles due to consumption of high-fat diet.