

# CHAPTER I

## INTRODUCTION

### 1.1 Background

World Health Organization (WHO) in 2005 reported that the number of patients affected by diabetes mellitus in Indonesia ranked fourth in the world population. It estimated that the increase would occur from 8.6 million in 2000 to 21.2 million in 2030. According to the American Diabetes Association (2014), diabetes mellitus is a metabolic disease with hyperglycemia disorders that occur due to the insulin secretion or the insulin action. Type 1 diabetes mellitus is caused by  $\beta$ -pancreatic cell damage which usually occurs due to autoimmune and idiopathic processes. In this type of diabetes mellitus insulin secretion decreases or stops. While, type 2 diabetes mellitus is caused by insulin resistance and requires an increase in the amount of insulin production (Gardner, 2007).

Diabetes mellitus is related to the pancreas. The pancreas is a compound gland consisting of exocrine and endocrine tissues. The pancreatic endocrine gland is composed of the islet of Langerhans which is a cluster spread throughout the pancreatic exocrine. The endocrine unit called Langerhans islet has four types of cells, namely alpha cells, beta cells, delta cells, and PP cells (pancreatic polypeptide). Beta cells produce the hormone insulin and play a role in reducing blood glucose levels. Whereas in the exocrine glands there are acinar cells that produce digestive enzymes and ductal cells that connect acinar cells to the digestive organs. Histological changes in the pancreas of people with diabetes mellitus had reported both quantitatively and qualitatively (Seungburn, 2007).

Changes in the histological structure of the pancreatic Langerhans islet are one of the pathological features that are often found in patients with diabetes mellitus significantly. In patients with type I diabetes mellitus, the changes in the pancreas are observed in the form of a reduction in the size

of the pancreas, atrophy in the exocrine part of the pancreas, and atrophy of the acinar cells around the degenerating Langerhans islet. Whereas type II diabetes mellitus occurs an imbalance of exocrine pancreatic secretions and impaired blood glucose control (Sandberg & Philip 2008). Therefore, the research on the effect of hyperglycemia on the histological picture of the pancreas and its role in the pathogenesis of diabetes mellitus is fundamental.

All kinds of diseases must have a cure, according to the hadith of the Prophet Muhammad below:

لِكُلِّ دَاءٍ دَوَاءٌ ، فَإِذَا أَصَابَ الدَّوَاءُ الدَّاءَ ، بَرَأَ بِإِذْنِ اللَّهِ عَزَّ وَجَلَّ

*“Every disease must have a drug. If a drug is following the disease, then he will recover with the permission of Allah Subhanahu wa Ta’ala. “(HR. Muslim)*

Diabetes mellitus drugs that are often given are oral antidiabetic or insulin drugs, but these treatments can sometimes have an adverse effect. Among others, nausea, discomfort stomach, anorexia, severe hypoglycemia and even long-term complications that can be dangerous and lead to more expensive costs in treatment (Shafiee *et al.*, 2012). Judging from the many side effects are caused by the oral antidiabetic treatment so many patients are trying to control their blood glucose levels with traditional medicine, one is by the utilising natural ingredients (herbal plants) which are expected not to cause side effects or other diseases (Shafiee *et al.*, 2012).

God has created various types of plants which have many benefits including being consumed as medicine. One of these plants is okra (*Abelmoschus esculentus* [L.] Moench). Okra has a chemical content of  $\alpha$ -cellulose and hemicellulose which can provide anti-diabetic effects. Both materials are dietary fibre. The fibre is known to reduce total cholesterol and LDL levels and can reduce excess sugar in the blood by limiting the absorption rate of sugar in the intestinal tract (Kumar, 2013).

The use of okra often overlooked because of the way of consumption that is less desirable. Therefore, it can overcome by making okra in coffee preparations. Coffee is daily drinking in the Indonesian community both in the lower and the upper middle class, but coffee that commonly consumed contains caffeine. According to Bawazeer *et al.* (2013), 34.3% of energy drinkers containing caffeine have side effects including palpitations, insomnia, headache, tremor, anxiety, and nausea and vomiting. Besides, the high consumption of caffeine can cause dependency effects (Juliano, 2004). Okra coffee is one of the coffee drinkings that does not contain caffeine, so it does not cause addiction because the making of okra coffee is functioned as a treatment for diabetes mellitus.

Research on okra plants has been carried out by Uraku (2011) which showed that the extract of okra fruit using ethanol solvent had a hypoglycemic effect on mice so that it could be used in the treatment of diabetes mellitus. Research by Perez (2013) showed that the soaking of okra fruit caused a decrease in blood sugar levels in rats. The study conducted by Anggarda (2017) showed that the administration of okra leaf extract and okra fruit extract in mice that experienced hyperglycemia could significantly reduce blood sugar levels. Based on the research, there has been no research on okra seeds even used as coffee. Therefore the author wanted to do research entitled “Histological Studies of Pancreatic in Mice Induced by Alloxan and given a Steeping Coffee of Okra (*Abelmoschus esculentus* [L.] Moench)”.

## **1.2 Problem Formulation**

The formulation of the problem in this study is how the histological of pancreatic in mice induced by alloxan and given a steeping coffee of okra is?

## **1.3 Research Objectives**

The purpose of this study is to determine the histological of pancreatic in mice induced by alloxan and given a steeping coffee of okra.

## **1.4 Benefits of Research**

### **1.4. Theoretical Benefits**

The theoretical benefit of this research is as a reference for further research that will be carried out by further researchers or students.

### **1.4.2 Practical Benefits**

The practical benefit of this study is expected to provide information about okra coffee as a decrease in blood glucose levels and to know the description of pancreatic histology.