

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Research

Diabetes Mellitus is a degenerative diseases that is non-communicable diseases that can cause death, in 2012 as many as 1.5 million people all over the world experienced deaths caused by diabetes mellitus (World Health Organization, 2016). The last estimate of the International Diabetes Federation in 2013 was 382 million people living with diabetes mellitus in the world. In 2035 this number is expected to increase to 592 million (Ministry of Health, 2018). While in Indonesia 10 million cases of diabetes mellitus have been found in 2015 (International Federation of Diabetes, 2018).

The prevalence of diabetes mellitus in Indonesia continues to increase, this is evidenced based on the data of Baseline Health Research 2018, an increase in people with diabetes mellitus over the age of 15 years. Patients with diabetes mellitus in Indonesia in 2013 reached 6.9% while in 2018 people with diabetes mellitus in Indonesia increased to 8.5% (Ministry of Health, 2018). The prevalence of diabetes mellitus in adults aged 18-99 years is estimated to reach 8.4 % in 2017 and predicted to increase to 9.9% in 2045 (IDF, 2017). The highest increase in the number of people with diabetes mellitus occurs in Southeast Asia. In 2025 Indonesia was estimated to be ranked fifth in the world with by the number of patients as many as 12.4 million people, up to two levels compared to 1995 with the number of patients as many as 4.5 million people (WHO, 2012).

The cause of type 2 diabetes mellitus is the failure of insulin target cells that are unable to respond to insulin normally. As a result, there is an abnormal merging between the insulin receptor complex and the glucose transport system (Price , 2005). Thus, glucose spreads into the bloodstream and increases in the blood due to the disruption of insulin function (insulin resistance) (Department of Health, 2012). Based on the impact arising from

the increase in people with diabetes mellitus, prevention and treatment efforts need to be done. As for functional food is very beneficial for health and does not cause side effects on growth.

Plants and living things do not grow by themselves, but the earth's plants grow with the permission of Allah SWT, and all of Allah's creations on this earth always have unknown benefits in it. As the word of God in Ash-Syu'araa 'verses 7-8, which states that plants and living things on earth have signs of the greatness of Allah SWT.

أَوَلَمْ يَرَوْا إِلَى الْأَرْضِ كَمْ أَنْبَتْنَا فِيهَا مِنْ كُلِّ زَوْجٍ كَرِيمٍ (٧)

Do they not look at the earth, how many noble things of all kinds We have produced therein? (7)

إِنَّ فِي ذَلِكَ لَآيَةً ۖ وَمَا كَانَ أَكْثَرُهُمْ مُؤْمِنِينَ (٨)

Verily, in this is a Sign: but most of them do not believe (8).

Cinnamon is an Indonesian spice that is widely used by the public, either as a food flavoring or natural flavor in drinks. But some people do not know the efficacy in cinnamon in it. Yogurt is fermented milk which not everyone likes, so many people do not consume these functional drinks. Cinnamon and yogurt have a positive influence on type 2 diabetes mellitus with different mechanism processes. Cinnamon (Cinnamomum) has an similar affects to insulin which can activate insulin receptors so that it can increase glucose absorption (Thahjani, 2014). Yogurt contains good bacteria that can reduce blood glucose levels and increase levels of high-density lipoprotein (HDL) (Moroti , 2012).

Cinnamon contains cinnamaldehyde compounds that can increase glucose transport by Glucose Transporter 4 (GLUT 4) in adipose cells and skeletal muscles so that they can reduce blood glucose significantly (Shen, 2011). Besides, to the cinnamaldehyde compounds contained in cinnamon, the presence of good bacteria used for fermentation can also be beneficial for health. One of them is *Lactobacillus bulgaricus* and *Streptococcus*

*thermophilus* in yogurt which have a positive effect on type 2 diabetes mellitus (Ejtahed, 2012). So the provision of yogurt can be used as an alternative therapy for type 2 diabetes mellitus (Sari, 2017).

The combination of yogurt and cinnamon powder in the current study seeks to find the right dose in reducing and controlling blood glucose levels in patients with type 2 diabetes mellitus, then cinnamon yogurt can be used as an alternative drink as a therapy for diabetes mellitus. Based on previous research mentioned that yogurt is proven to reduce blood glucose and insulin levels of metabolic syndrome rats with the most effective dose of 0,018 ml/gram of body weight rats/day (Rahmawati, 2017). Based on previous research, giving of cinnamon powder as much 7,2 mg/tail/day given for 21 days can reduce rat blood glucose levels up to 45,77% (Tusara, 2013).

This research is the development of yogurt products added with cinnamon powder. Patents on this product are expected to be a reference source for other researchers who want to develop yogurt and cinnamon products.

## **1.2 Formulation of The Problem**

Is there any effect of giving yogurt with cinnamon powder (*Cinnamomum burmannii*) on fasting blood glucose levels in rats?

## **1.3 Objective of Research**

### **1.3.1 General Objective**

Analysis the effect of giving yogurt with cinnamon powder (*Cinnamomum burmannii*) on fasting blood glucose levels in rats.

### **1.3.2 Specific Objective**

- a. Analysis the effect of giving yogurt with cinnamon powder (*Cinnamomum burmannii*) with a yogurt dose of 3,6 ml/200 grams body weight and cinnamon powder (*Cinnamomum burmannii*) 7,2 mg/200 grams of body weight on blood glucose levels in rats.

- b. Analysis the effect of giving yogurt with cinnamon powder (*Cinnamomum burmannii*) with a yogurt dose of 3,6 ml/200 grams body weight and cinnamon powder (*Cinnamomum burmannii*) 14,4 mg/200 grams of body weight on blood glucose levels in rats.
- c. Analysis the effect of giving yogurt with cinnamon powder (*Cinnamomum burmannii*) with a yogurt dose of 3,6 ml/200 grams body weight and cinnamon powder (*Cinnamomum burmannii*) 21,6 mg/200 grams of body weight on blood glucose levels in rats.
- d. Analysis of differences in fasting blood glucose levels for all dose variation.
- e. Analaysis the level of hedonic test of yogurt with cinnamon powder (*Cinnamomum burmannii*).

## **1.4 Benefits of Research**

### **1.4.1 Institution**

As one of the reference materials for further research. The results of this study can provide information about the effect of giving yogurt with cinnamon powder on fasting blood glucose levels.

### **1.4.2 Society**

Find of effective dosage for people with diabetes mellitus by using cinnamon and yogurt as a substitute therapy for drugs that can be used by people with diabetes mellitus to reduce weight and blood glucose levels.

### **1.4.3 Researcher**

- a. Adding knowledge in the field of research with experimental methods.
- b. Extending insight and knowledge about the potential of traditional plants in Indonesia and their functions in health

## 1.5 Authenticity of Research

No	Title	Research Methods	Research Result	Difference
1	Ika Dewi Kusumaningtyas, 2014 “Effect of Cinnamon Steeping ( <i>Cinnamomum burmannii</i> ) on Pancreatic Structure Mice ( <i>Mus musculus</i> ) Diabetic Balb-C Strain”	Experimental Pre-clinical	Administration of steamed cinnamon ( <i>Cinnamomum burmannii</i> ) Influence the improvement of pancreatic structure after alloxan exposure (p <0,01)	Add yogurt to the treatment and observing blood glucose levels, rats as samples
2	Andriana Murdi Hastuti, 2014 “Effect of Adding Cinnamon to The Antioxidant Activity and Total Sugar Content of The Functional Drink of Secang and Stevia Leaves as an Alternative Drink for People With Type 2 Diabetes Mellitus”	Experimental Clinical	The most preferred functional drink by panelist was drink with 1,5 % cinnamon adding with greatest like result on color and like result on aroma and flavor.	Using yogurt with cinnamon powder as a treatment material, rats as samples
3	Prettika Juhan, 2016 “The Effect of Giving Cinnamon Powder ( <i>Cinnamomum zeylanicum</i> ) on Fasting Blood Glucose Level 2 Prandial Post-Hour in Patients with Type 2 Diabetes Mellitus”	Experimental Clinical	There were significant difference (p <0,05) in the three test groups, with the most significant changes in the 10 gram group with a correlation level of 0,000	The research subjects were wistar rast, using cinnamon powder, rats as samples

No	Title	Research Methods	Research Result	Difference
4	Fiqhi Cahyaningrum, 2017 “Effect of Banana Sinbiotic Yogurt on Levels of Glucose and Insulin in Metabolic Syndrome Mice”	Experimental Pre-clinical	There were differencens in glucose and insulin levels before and after treatment in groups P2 (p=0,000)	Yogurt made from skim milk and adding cinnamon powder, rats as samples
5	Pratiwi Purnama Sari, 2017 <i>Lactobacillus casei</i> Fermented Milk as a Treatment for Diabetes in Mice ( <i>Mus musculus</i> )	Experimental Pre-clinical	There was a decrease in blood glucose levels in rats in P3 and P4 treatment (p-<0,01)	Yogurt was added with cinnamon powder, rats as samples

**Table 1. Authenticity of Research**