CHAPTER I
INTRODUCTION

1.1 Significant of the study

Noncommunicable chronic disease (NCDs), such as hypertension, hyperlipidemia, type 2 diabetes mellitus, cardiovascular disease, metabolic syndrome, high cholesterol levels, and cancer, cause worldwide death. (Ejigu & Tiruneh, 2023). The one factor that increase NCDs risk is Obesity and overweight which cause by life behavior especially eating behavior. The one of reason of overweight and obesity is eating behavior that lead to excessive energy consumption per energy expenditure (Wright and Aronne, 2012, Romieu et al., 2017). behavior.

Type 2 diabetes mellitus is one of noncommunicable chronic disease (NCDs) that body cells have low effective insulin action or insulin resistance that lead to hyperglycemia, also the type 2 diabetes mellitus is found in the majority of peoples who have diabetes mellitus. Type 2 diabetes mellitus usually found in age 30 or upper, obesity (Asian body mass index ≥ 23 kg/m^2), The patient might or might not have any abnormal symptoms, which are usually symptoms not severe but gradually progress, usually appear in parents or sibling. Risk of type 2 diabetes mellitus increased by older age, higher weight, lack of exercise, and more appear in woman who previous history of diabetes mellitus when pregnancy (Clinical Practice Guideline for Diabetes, 2017). The one of reasons that lead to type 2 diabetes mellitus is consuming behavior but it can be prevented by consuming some bioactive compound from some food. The one of those is α-amylase inhibitor (αAI) which found in white bean (*Phaseolus vulgaris*) that can slower starch absorption first reported by Bowman (1945) named as phaseolamin by Marshall and Lauda (1975) So that, there are many works study the effect of αAI in *P. vulgaris* on of type 2 diabetes mellitus, overweight, obesity or other NCDs in animals (Tormo et al., 2004; Fantini et al., 2009; Oliveira et al., 2014; Micheli

et al., 2019; Ezzat et al., 2021) or human subject (Spadafranca et al., 2013; Wang et al., 2020; Jäger et al., 2024)

This study expored the effect of *P. vulgaris* extract on diabetes induced rats. The difference of previous studies and this study are induction of diabetes and this study additionally investigate proteins related in insulin signaling. The induction of diabetes in rats was done using a cafeteria diet (CAF) because it is similar to human food. The preparation *P. vulgaris* extract method with high specific αAI activity and identification of group of bioactive compounds with show αAI activity was investigate too.

1.2 Research objectives

(1) To prepare *P. vulgaris* extract with high specific αAI activity.

(2) To identify group of bioactive compounds with show αAI activity.

(3) To investigate the effect of *Phaseolus vulgaris* extract on insulin resistance and hepatic steatosis in obesity induced Wistar rats.

1.3 Research hypothesis

P. vulgaris extraction condition with high specific α-amylase inhibitory activity could be found. PVE could have alleviation effect in obese male Wistar rats.

1.4 Scope of the study

Perform optimization of *P. vulgaris* extraction condition with a Box-Behnken and Response surface methodology to get high yield and specific α-amylase inhibitory activity. Investigate the effect of PVE on alleviation in male Wistar rats obese induced with CAF.

1.5 Expected results

(1) White bean extract preparation method.

(2) Bioactive compound identification in white bean extract.

(3) Approved in bioactivity of white bean extract in vivo in tern of reduce insulin resistance and hepatic steatosis.

1.6 Reference

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