CHAPTER I

INTRODUCTION

1.1 Background

Hypercholesterolemia is a common problem in modern lifestyle, as there are so many foods that is high in cholesterol. However, there are 2 types of cholesterol, which are cholesterol that is carried by HDL (High Density Lipoprotein) and cholesterol that is carried by LDL (Low Density Lipoprotein) (Libonati, 2011). When LDL is oxidised, it can infiltrate the artery lining and cause many complications. For example, the accumulation of cholesterol in artery wall can cause artherosclerosis. The other common disease that caused by high cholesterol in body is coronary heart disease.

There are some ways to lower the LDL level in human body besides taking drugs, which are exercise and controlled diet. Consuming food that is low in saturated fat and cholesterol, also reduced-fat foods help in lowering LDL level (Brill, 2006). Reduced-fat food product has been popular for more than 15 years because products with partial fat reduction has a sensory property closer to that of full-fat version (Meister and Doyle, 2009).

Brownies is one of dessert that is quite popular with people from various age. However, in brownies making, the fat used are either butter containing saturated fat or margarine containing trans-fat. The amount of saturated fat in brownies is approximately 50% of total butter used (USDA, 2017) and 16-36% trans fat of total margarine used (Chow, 2008). These two types of fat can raise

the LDL level. On the other hand, unsaturated fats such as monounsaturated and polyunsaturated fats do not raise LDL cholesterol and are beneficial when consumed in moderation.

Avocado (*Persea americana*) contains predominantly monounsaturated fatty acids and the only fruit that contains it. The type of monounsaturated fatty acids in avocado is oleic acid. So, when incorporated into an overall healthy diet, reduced-fat foods made with avocado can play an important role in helping consumers reach and maintain their goal of reducing consumption of dietary fat. Avocado also has buttery texture due to its high fat content and according to Wekwete and Navder (2008), avocado puree has been successfully replaced up to 50% of fat in oatmeal cookies. That is why, avocado has a potential to be used in reduced fat brownies making.

Brownies are usually made with wheat flour and there are three types of wheat flour commonly used in Indonesia classified based on the protein content, which are cake flour, all-purpose flour, and bread flour. Lower protein flour has lower price in the market, which is cake flour.

The growing tendency to spend less time on food preparation has been a growing trend, as it can be seen by the growth in demand for bread and biscuits (Bhatt *et al*., 2008).

1.2 Research Problem

Trans-fat or saturated fat is commonly used as the source of fat in brownies making. However, both fats can increase LDL level in human body

which eventually infiltrate the artery lining and cause many complications. That is why, a study to use avocado puree as a natural fat replacer is needed as it contains abundant monounsaturated fatty acid that may lower LDL level. Considering sensory and physical characteristics like flavour and texture are the main hurdle that commonly faced in fat replaced product, it is important to determine the best treatment in obtaining best result. Brownies in market usually made from all-purpose flour, so it is interesting to know the preparation of brownies using avocado with different types of wheat flour.

1.3 Objectives

1.3.1 General Objectives

The general objective of this study is to use avocado puree as a natural fat replacer to replace butter or margarine in brownies making and give nutritional benefits towards the brownies.

1.3.2 Specific Objectives

The specific objectives from this research were:

1. To determine effect of ratio of avocado puree to margarine added to brownies prepared with each type of wheat flour i.e. cake flour, all-purpose flour, and bread flour on physicochemical characteristics of brownies baked using oven or microwave oven; and to select best brownies formulation from each type of wheat flour.

2. To determine sensory characteristics of brownies made from selected formulation baked in oven and microwave oven; and to select best formulation based on this sensory characteristic.
3. To determine the proximate composition of selected brownies among three type of flour and each baking method.
4. To compare mean results from brownies made using two types of baking method, which are oven and microwave oven in brownies making.