

CHAPTER 1: INTRODUCTION

1.1. Background

Obesity is one of many major health problems in the world. It is caused by an abnormal accumulation of fat in the adipose tissue due to an imbalance in food intake. Moreover, many other factors could contribute to the development of obesity, such as lifestyle habit (sedentary lifestyle), physical inactivity, medical condition, and genetics. According to WHO, a total of 13% of the world population was afflicted by obesity in 2016 (WHO, 2018). The prevalence of obesity amongst the adult population in Indonesia lies at 23.1% (Harbuwono, Pramono, Yunir & Subekti, 2018). Within the Asia region, people are considered as obese if their BMI (Body Mass Index) is ≥ 30 kg/m² (Vasanth Rao, Candasamy & Bhattamisra, 2019). Furthermore, the disease itself is often associated with the development of many other non-communicable diseases such as type 2 diabetes, hypertension, cancer, and CVD (Wang *et al.*, 2019). Therefore, it is better to prevent obesity in order to decrease the risk of developing the other diseases.

There are many actions that could be taken to prevent the development of obesity. One of them is to take herbal/ plant-based medicine. The use of herbal medicines has been utilized since a long time ago in the past. It is believed that herbal medicines or plant-based medicines can be considered as safe because the ingredients used are mainly come from food that are consumed by human in daily basis. It can also be considered cost effective because of the fact that it cost less compared to synthetic drugs (Abdel-Aziz, Aeron & Kahil, 2016). The WHO stated that 80% populations in developing countries have been utilizing herbal medicines for primary healthcare (Mathur & Velpandian, 2009). Increasing awareness of herbal drugs utilization has made scientist to do more research towards the use of medicinal plants to find their use towards overcoming many diseases.

Tamarind (*Tamarindus indica*) or commonly known as "asam jawa" by Indonesian people is a multipurpose plant that is commonly used in many occasions. Many people believed that tamarind

has been used for over centuries as a traditional herbal medicine. In the country of its origin, which is tropical Africa, tamarind is usually mashed into a poultice then applied to treat wounds or it could be eaten for treatment of abdominal pains, diarrhoea, and respiratory problem, also act as a laxative (Havinga *et al.*, 2010). In Indonesia, tamarind itself has been used as a mixture in “jamu” or Indonesian traditional drinking medicine. Countries such as India, Sri Lanka, Malaysia, Thailand, and in Indonesia (especially in Java) have been using tamarind in their local food recipes (Yahia & Salih, 2011). In Indonesia, tamarind is used in *sayur asam*, *asem-asem*, *garang asem*, etc., and also incorporated in drinks and used in confectionery products like tamarind candies. The total consumption of tamarind in Indonesia as a food ingredient has been projected to be the largest which is 0.107 kg/ capita/ year when compared to other herbs that are often being used as the main food ingredients (Pribadi, 2009).

The health benefits of tamarind have pushed many researchers to investigate more about the effect of tamarind towards many diseases. Tamarind possesses many bioactive compounds or phytochemicals. According to Santos *et al.* (2019), bioactive compound could be described as a molecule that is available in small quantity in many sources (fruits, vegetables, plants, etc.) and could provide many health benefits and therapeutic potentials by affecting the energy intake and aiding metabolic disorders for the one who consumed it. Therefore, utilization of tamarind could provide many health benefits towards the body and possibly aid in reducing the chances of developing obesity.

1.2. Objective

To investigate the effect of *Tamarindus indica* extract on the suppression of lipid accumulation in 3T3-L1 cells.

1.3. Hypothesis

The extract of *Tamarindus indica* decreases the amount of lipid accumulation in 3T3-L1 cells.

1.4. Benefit of the Study

This study can provide a further understanding regarding the relation of *Tamarindus indica* extract towards its interaction with the prevention of obesity development during the adipogenesis within the cells.