CHAPTER 1

INTRODUCTION

1.1 Problem Background

Cancer is the class of diseases delineated by the abnormal cell growth in which it leads to the invasion of the normal cells in the body. The progression of carcinogenesis is influenced by several factors such as genetic, unhealthy lifestyle, chronic irritation, and exposure of radiation and chemical agents (Kementrian Kesehatan RI, 2015). Currently, it is accounted as one of the leading causes of death with 8.2 million death cases reported in 2012 worldwide (Ferlay et al., 2012). Among its type, breast cancer is one of the most common cancer in less developed nations which deemed as much as 883.000 cases (Ferlay et al., 2012). In Indonesia, the mortality rate of breast cancer is 18.6 per 100.000 populations (Ng et al., 2011). DI Yogyakarta (2.4%) is the province that has the highest prevalence of breast cancer, followed by East Kalimantan (1.0%), West Sumatra (0.9%), Aceh (0.8%), Jakarta (0.8%) and Bengkulu (0.8%) (Kementrian Kesehatan RI, 2015).

1.2 Problem Formulation

To this date, several treatments such as chemotherapy, surgery, radiation, and immunotherapy are registered to the patients as the golden standard for cancer intervention. Such remedies are not only allowed to cure the disease but also able to prevent disease progression and the remission of the cancer morrow. Despite its propitious outlook, different parlous side effects have shown in the therapy process. Namely headache, muscle and stomach pain, jaw stiff and mouth sore are the side effects of the treatment. These unintended effects can limit both physical and psychological of the patients that can affect the activity on a daily basis.

Over the last decade, research on anticancer drugs has broadened to the area of herbal medicine. The generation of anticancer activity from plant-based source has shown the roseate compound to be used as the drug candidate. One of the prospective herbals is *Alpinia galanga*.

Alpinia galanga, also known as Languas galangal is classified in the *Zingiberaceae* family which has been widely used for culinary and medicinal purposes (Ravindra et al., 2012). It is a perennial plant which abundantly found in Indonesia, Malaysia, China, and the southern parts of India (Sina, 2003). The extracts of *Alpinia galanga* have been found to contain several essential substances include flavonoid, terpenoids, phenols, carbohydrates, and proteins (Melanathuru et al., 2017). Even though several studies have proven the pharmaceutical activity of *Alpinia galanga*, the extensive pre-clinical study regarding its toxicity effect to the cancer cell especially in T47D cell lineand normal cell lines has not yet to be studied. The cytotoxicity study will be able to give the overview of the anticancer activity of *Alpinia galanga* towards the T47D breast cancer cell line as well as its effect to the normal cell line.

1.3 Research Objectives

Based on the problems formulated above, assorted objectives of the research have been forged:

1. To determine cytotoxic activity of *Alpinia galanga* extract towards T47D breast cancer and Vero normal cell line by using MTT assay.
2. To analyze *Alpinia galanga* effect on cell cycle distribution and apoptotic activity in breast cancer cell model *in vitro*.