

Effect of methanol extract of loquat leaves in rats induced by *benzo(a)pyrene*

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Abstract. Cancer is a disease caused by the growth of uncontrolled body cells. One type of cancer has a high enough mortality rate in the world is breast cancer. One of the attempts in cancer treatment is the use of chemopreventive compounds derived from plants. One of the crops believed to be potentially anti-cancer is the loquat plant (*Eriobotrya japonica* Lindl.). This study used experimental methods of laboratories with the type of design used is complete random draft (RAL) with five treatments and six repeats. The treatment is K + (without any treatment), K- (animal test will be given *Benzo(a)Pyrene*). The treatment group of BAP-Administration is added to the leaves extract of loquat per oral with varying dose concentrations starting from doses 200 (P1), 300 (P2) and 400 (P3) mg/kg body weight. The results showed that there was no noticeable difference between the treatment groups both for rat weight loss, tumor weight, tumor diameter and tumor volume.

1. Introduction

Cancer is a disease caused by the growth of uncontrolled body cells. The growth of these cells can cause interference in tissues and their physiological functions that can be fatal to human health and survival. Nowadays cancer is one of the deadliest diseases in the world. Cancer disease is categorized as the most disease causing death in the world and the growth of this disease year by year is increasingly pesat[1]. Based on the results of the census conducted in 2012, there have been reported 14.1 million cases of cancer in the world and 8.2 million of them are dying. Among the high mortality rates of the disease, almost 57% are experienced by developing country[1].

One of the most numerous types of cancer that causes death is breast cancer. Breast cancer is the most common cancer in women and is the highest cause of death after lung cancer[2]. Research has been conducted showing that in the United States, patients with breast cancer reached a number 232,340 reporting case with a mortality rate of 39,620 deaths throughout the year 2013[3]. In the year 2015, still in the United States the number of deaths due to breast cancer increased to reach the number 4,290 cases[4]. Meanwhile, the spread of breast cancer in the Asian region is growing rapidly. Data obtained in 2012, as many as 639,824 cases of breast cancer are recorded in the Asia[5]. Research has been conducted showing five countries in Asia that have the highest mortality rates that are India, China, Indonesia, Pakistan and Japan. Indonesia itself in 2012 has a case of breast cancer as many as 48,998 people, with the mortality rate of breast cancer people reach 19,750 people[5].

Nowadays there have been many different methods of cancer treatment such as removal of cancer tissues through surgery, chemotherapy to radiotherapy. All these methods of treatment are commonly done by cancer sufferers. However, the above treatment methods have a long-term effect that is very harmful to the body. Therefore, the development of other treatment alternatives that can reduce the effects of the cancer. One of them develops treatment using chemopreventive compounds derived from the plant[6]. The chemopreventive compound is a chemical compound derived from plants that have a potential anti-cancer so it can be developed as a new method of treatment effective by utilizing compounds from nature. One of the crops believed to be potentially anti-cancer is loquat (*Eriobotrya japonica* Lindl.)[7][11].

Loquat (*Eriobotrya japonica* Lindl.) is a native plant from mainland China that has undergone extensive distribution so that today the loquat are located in various countries of the world. Loquat has many benefits in the field of health. In its home country, loquat is already widely used for herbal medicine[8]. Research has been conducted revealed that on the leaves of loquat there are several phytochemical compounds such as triterpen, Sesquiterpen, flavonoids, and tannin[8]. The content of this phytochemical compound makes loquat very potential for treatment. Various studies have been conducted to test the effectiveness of loquat in treating diseases. Loquat has the potential for anti-inflammatory activity, as an antioxidant, anti-diabetes, bronchitis acute treatment, anti-virus, anti-mutagen and anti tumor[9].

Based on the explanation above, it is important to do this research with the aim to know the effectiveness of the biwa extract to the growth of cancer cells and to know the accuracy of the dose of the use of a biwa extract best to inhibit cancer cell growth. It is hoped that through this study can be known further benefits of the use of the biwa extract in inhibiting cancer cell growth as well as a new alternative in the treatment of cancer diseases.

2. Material and Methods

2.1 Plant material and extract preparation

The leaves of loquat are obtained from residents in the Brastagi district of North Sumatera Karo Regency. After being collected in the field then the leaves are clean-washed first and weighed. After that, the leaves of loquat are used in the oven at 40°C until attain the standart water content of simplisia. The dried simplisia are then pounded until smooth and sifted with the B30 sieve. The leaf powder of loquat is extracted by maceration method using methanol solvent. The obtained liquid extracts are then cloned using a rotary evaporator.

2.2 Animal preparation

The animals that use in this research is female rats with range of body weight between 200-250 g. The animals have been divided into 5 treatment groups will experience the adaptation process for 2 weeks by targeting the same feeding and drinking water. Then the test animals on the positive control group and the treatment group will each be injected *benzo a pyrene* with a single dose of 50 mg/kg body weight in the area around the mammae gland. After the injection of the animal is tried to be maintained as usual until a cancer lump formed by 1 cm. To figure out the development of the lump formed, the palpation will be done every day in the animal try. After forming a cancer network of 1 cm, then the mouse will be given a oral extract of biwa according to the dose of treatment is 200, 300, 400 mg/kg body weight for 30 days. On the 31st day the whole animal test will be killed with a cervical dislocation method in an anesthetic state for later taken mammae glands, after which the tumor weighs, the diameter of the tumor and the calculation of the tumor volume.

3. Result

3.1 body weight of rats

The results showed that rats with the highest weight is P3 with a weight of 226.3 g while the lowest weight is K-with a weight of 191 g. Based on statistical analysis test results are not shown Difference between each treatment group. The result of observing the mouse weight can be seen in the figure 1.

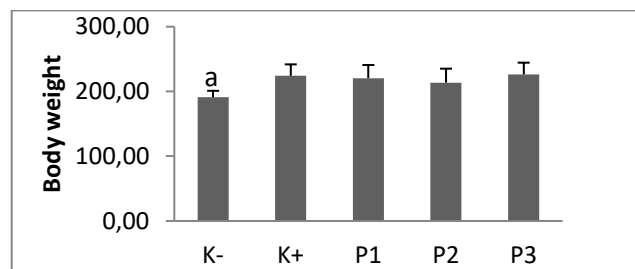


Figure 1. Effect of methanol extract against body weight of rats. K- = Control negative (mice not given treatment); K + = Positive control (BAP); P1, P2 and P3 = Treatment with the BAP and concentration of methanol extract of the leaf Biwa 200 mg/kg, 300 mg/kg, and 400 mg/kg; units in cm.

3.2 Weight of tumor

The results showed the rats with the highest tumor weight is P2 with a weight of 2.75 g while the low tumor weight is K + with a weight of 0.36 g. Based on statistical analysis test results are not shown Difference between each treatment group. The results of observation of the rat tumor weight can be seen in the Figure 2.

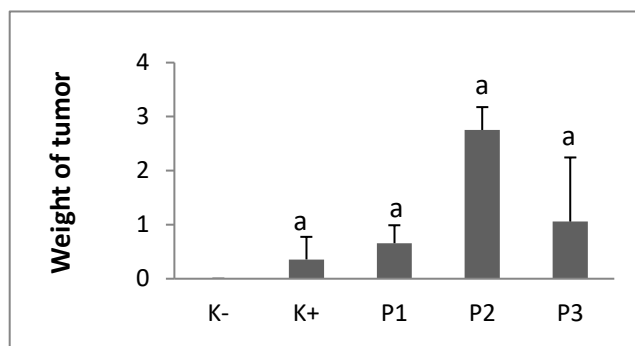


Figure 2. Effect of methanol extract against weight of tumor in rats. K- = Control negative (mice not given treatment); K + = Positive control (BAP); P1, P2 and P3 = Treatment with the BAP and concentration of methanol extract of the leaf Biwa 200 mg/kg, 300 mg/kg, and 400 mg/kg; units in cm.

3.3 Diameter of tumor

The results showed that the rat with the highest diameter of the tumor is K + 0.97 cm while the least diameter of the tumor is P3 of 0.72 cm. Based on statistical analysis test results are not shown Difference between each treatment group. The result of observation of the rat breast tumor diameter can be seen in the picture below.

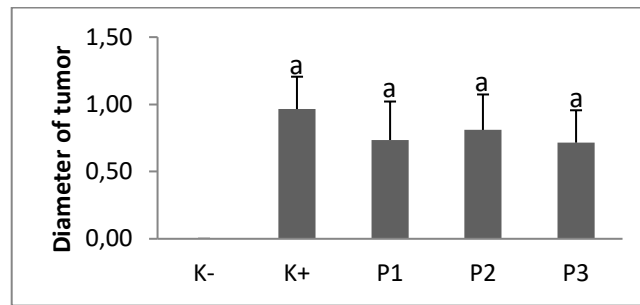


Figure 3. Effect of methanol extract against diamater of tumor in rats. K- = Control negative (mice not given treatment); K + = Positive control (BAP); P1, P2 and P3 = Treatment with the BAP and concentration of methanol extract of the leaf Biwa 200 mg/kg, 300 mg/kg, and 400 mg/kg; units in cm.

3.4 Volume of tumor

The results showed that the rats with the highest tumor volume is P2 with a volume of 2.75 ml while the lower tumor volume is K-with a volume of 0.6 ml. Based on statistical analysis test results are not Noticeable differences between each treatment group. The result of observation of the rat breast tumor volume can be seen in the picture below

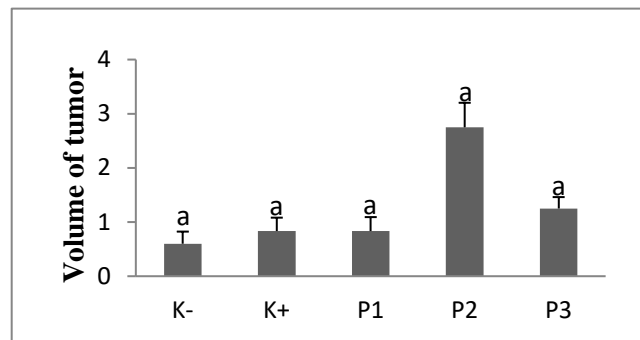


Figure 4. Effect of methanol extract against volume of tumor in rats. K- = Control negative (mice not given treatment); K + = Positive control (BAP); P1, P2 and P3 = Treatment with the BAP and concentration of methanol extract of the leaf Biwa 200 mg/kg, 300 mg/kg, and 400 mg/kg; units in cm.

4. Discussion

Based on the results of studies that have been done can be seen that there is no significant increase in mouse weight between the control group and the treatment. Figure 1 shows that the admission of BAP or methanol of the loquat leaf does not affect the weight of rats. This corresponds to the statistical analysis results that there is no noticeable difference between the treatment groups. Figure 2 shows that there was an increase in tumor weight in the group P1 and P2 but the tumor weight decreased in the P3 group. This could be due to a lack of concentration of extracts in groups of P1 and P2 that were used so as not to influence the tumor, while in the P3 group began to demonstrate the effect research has been conducted suggesting that the use of leaf extract of biwa is better in inhibiting the growth of cancer cells compared to using seed extract from loquat[10]. However, based on statistical analysis results shows no noticeable differences between the treatment groups.

Figure 3 shows that the rat tumor diameter is decreasing as the administration of the methanol leaf Biwa extract. The highest concentration of extracts showed the best results in inhibiting the growth of cancer marked by the diameter of the tumor is increasingly shrinking. The content of phytochemical compounds contained in loquat makes the plants biwa potential

to be used as a treatment ingredient. Plants Biwa has the potential for anti-inflammatory activity, as an antioxidant, anti-diabetes, bronchitis acute treatment, anti-virus, anti-mutagen and anti tumor[9]. However, statistical analysis results do not indicate a noticeable difference between the treatment groups. Figure 4 shows that the higher the concentration of a given extract, the larger the tumor volume. This suggests that the concentration of the administered methanol extract of the leaf biwa does not affect the growth of rat breast tumor. This is demonstrated based on the statistical analysis results that there is no noticeable difference between the treatment group. One of the causes is that the extract contains a wide range of not specific active compound so that it requires a larger dose to cause the expected effect.

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