

CHAPTER I

INTRODUCTION

1.1 Background

Air is the most important factor in life. However, in this modern era in line with developments in the physical development of cities, industrial centers, lifestyles, and transportation developments, air quality has changed (Ismiyati, 2014). In some communities, smoking is a habit that is difficult to break and is harmful to health. Smoking is not only dangerous for smokers but also those around them who are exposed to cigarette smoke. Cigarette burning will produce cigarette smoke which is divided into mainstream cigarette smoke and sidestream smoke. The main cigarette smoke is cigarette smoke produced from the suction of active smokers that contain 25% levels of harmful substances, while side smoke is cigarette smoke from burning cigarettes inhaled by passive smokers containing 75% levels of harmful substances (Nurjanah,*et al.*, 2014).

Indonesian people's smoking behavior tends to increase from 34.2% in 2007 to 36.3% in 2013 (Restuti, 2018). Death rates from diseases caused by smoking continue to increase. In 2030, it is estimated that the death rate of smokers in the world will reach 10 million people, and 70% of them come from developing countries. (Kemenkes, 2015).

Contain chemicals that are generally toxic, carcinogenic and addictive so that it is bad for health. Smoking can increase the activity of the hematological system which is characterized by an increase in the number of erythrocytes, leukocytes, platelets, and hemoglobin in the blood (Besime,*et al.*, 2014). Carbon monoxide contained in cigarettes is known to increase hemoglobin levels in the blood (Restuti, 2018). Hemoglobin has an important role in binding, transporting and sending oxygen to all body tissues that need it. When bonded with oxygen, hemoglobin will produce the formation of oxyhemoglobin (HbO_2). The affinity of hemoglobin

binding to oxygen is influenced by pH, temperature, and the concentration of 2,3-diphosphoglycerate (2,3 DPG) in red blood cells (Susanti and Wirjatmadi, 2016).

The smoke of cigarette can increase free radicals in the body (Susanti and Wirjatmadi, 2016). Increased free radicals will increase the immune response, for example activation of inflammatory cells. This process will produce excess ROS (reactive oxygen species), which are the main oxidants in the body (Harlev,*et al.*, 2015). Excessive free radical compounds that are harmful to the body can be mitigated by their negative effects by antioxidants. The function of red blood cells is to carry oxygen from the lungs to be circulated throughout the body. This can be done because erythrocytes have hemoglobin (Hb). Hemoglobin is a special protein containing iron which is capable of binding oxygen. The oxygen that has been bound will be circulated throughout the body, in the cells of the body, oxygen is used for respiration to get energy (Kiswari, 2014).

A country in Southeast Asia has various types of plants that are rich in benefits, almost 90% of herbal plants are found in countries in the Asian region (Salim and Munadi, 2017). Herbaceous plants that have natural sources of antioxidants are generally plants and are phenolic compounds that are spread throughout all parts of plants both in wood, seeds, leaves, fruit, flower roots or pollen. Flavonoids are a group of aromatics that include polyphenols and contain antioxidants. Flavonoids are secondary metabolites that are included in the polyphenol group. Both of these compounds have almost the same properties such as antioxidants, anti-inflammatory, anti-carcinogens, antiviral, antitumor and can inhibit neurodegenerative diseases. Flavonoids can also inhibit lipid peroxidation and fragility (Murningsih and Fathoni, 2016).

Marigold (*Cosmos caudatus* Kunth.) is a plant that commonly kept in the yard of the house both for the flowers to enjoy and for the leaves to be used as vegetables. Marigold has high potential and is used as a vegetable as a substitute for commercial vegetables in meeting human food

needs. Because it is an indigenous vegetable, it is only cultivated on a small scale and is local (Sahid and Murbawani, 2016). This is because marigold plants are only consumed by the community as cooked vegetables and raw vegetables or fresh vegetables. In East Java and Central Java, it is often used as an ointment vegetable, while in West Java the leaves and buds of young marigold plants are used as medicine to reduce bad breath and vegetables. Marigold leaves (*Cosmos caudatus* Kunth.) Have many health benefits including inflammatory activity because the content of flavonoids can improve blood circulation and strengthen bones and can increase appetite (Bunawan,*et al.*, 2014).

Marigold plants (*Cosmos caudatus* Kunth) are usually only considered as wild plants that often grow on houses and roadsides. This is the basis of studies to obtain data on the benefits and scientific influence of marigold plants (*Cosmos caudatus* Kunth.) on the profile of red blood cells in rats that have been exposed to cigarette smoke.

The health of the human body can be seen by blood hematological status of hemoglobin, the number of erythrocytes and hematocrit value. The purpose of this research is to be expected with the giving of marigold leaves can know and improve the health of rats that Wistar smoked through hemoglobin level, the number of erythrocytes and hematocrit value.

1.2 Formula problems

Based on the background above, the problem formulation in this study is that there any effect of marigold leaf giving (*Cosmos caudatus* Kunth) to the profile of red blood cells in Wistar rats (*Rattus norvegicus*) smoked cigarette smoke?

1.3 Research Purposes

1.3.1 General purpose

Knowing the effect of a marigold leaf (*Cosmos caudatus* Kunth.) on the red blood cell profile of Wistar rats (*Rattus norvegicus*) exposed to cigarette smoke.

1.3.2 Special Purpose

- 1 Proving the effect of marigold leaves (*Cosmos caudatus* Kunth.) On the increase in hemoglobin levels, the number of erythrocytes and hematocrit values in Wistar rats (*Rattus norvegicus*) exposed to cigarette smoke.
- 2 Knowing the dose of marigold leaves which has a significant effect on hemoglobin levels, the number of erythrocytes and hematocrit values of rats exposed by cigarette smoke.

1.4 Research Benefits

1.4.1 For Academics

- 1 Marigold leaf (*Cosmoscaudatus* Kunth.) is expected to enrich scientific studies on the use of herbs that are beneficial to health.
- 2 It is expected to be a reference for other students who want to know about the interpretation of clinical data regarding hemoglobin, erythrocytes and hematocrit.

1.4.2 For Practitioners

- 1 Increase knowledge about the content and benefits of marigold leaves (*Cosmos caudatus* Kunth.).
- 2 Increase the ability of researchers to conduct experimental studies in experimental animals.

1.5 Authenticity of Research

Table 1. Authenticity Research

No	Name & Title	Variabel / Method	Result	Difference
1.	The Value of Erythrocytes, Hemoglobin, and Hematocrit of Mice (<i>Mus musculus</i>) Exposed to Cigarette Smoke and Given Red Watermelon Extract (<i>Citrullus vulgaris</i>) (Heryanita, 2018).	Dependent variable: Value of Erythrocytes, Hemoglobin, and Hematocrit. Independent variable: Red Watermelon Extract	Administering red Watermelon extract using gastric sonde at a dose of 44 mg/kg of the mice that were given after the exposure of cigarette smoke for 30 days, may decrease the value of erythrocytes, hemoglobin and hematocrit squeaky cigarette smoke dipaped.	Independent variables: using the marigold leaves
2.	Effect of Marigold (<i>Cosmos caudatus</i>) Leaf Powder on Malondialdehyde Plasma Wistar Mice Diabetes Streptozotocin-Induced. (Suhardinata and Murbawani, 2015)	Dependent variable: plasma malondialdehyde levels. Independent variable: marigold leaf powder. Method: pre-clinical experiments	Marigold leaf powder of 700 mg / 200gBB / day (treatment 1) and 1400 mg / 200g / day (treatment 2) for 21 days was able to reduce the plasma MDA levels of diabetic Wistar rats induced by streptozotocin (p <0.05).	The dependent variable is the profile of red blood cells
No	Name & Title	Variabel / Method	Result	Difference

3	Effects of the administration of Dragon Fruit Juice (<i>Hylocereus undatus</i> (Haw.) Britt & Rose Against the amount of hemoglobin, erythrocytes and hematocrit in female white mice (Arifin, <i>et al.</i> , 2015)	Dependent Variables: Amount of Hemoglobin, Erythrocytes And Hematocrit Independent variable: Dragon Fruit Juice	Dragon fruit (<i>Hylocereus undatus</i>) can increase hemoglobin and erythrocytes in female white mice, but not affect the duration of administration in female white mice	The independent variable uses marigold leaves
4	Effects of Melon Extract (<i>Cucumis melo</i>) and Gliadin on the levels of Hb and Hbco male Wistar rats exposed to cigarette smoke (Susanti and Wirjatmadi, 2016)	Dependent variable: Hb and HbCO levels of male wistar rats exposed to cigarette smoke Independent variable: melon extract	Giving (<i>Cucumis melo</i>) and gliadin for 28 days significantly showed an effect on increasing Hb levels and decreasing HbCO levels in male wistar rats exposed to cigarette smoke exposure.	The independent variable uses marigold leaves and the dependent variable is the profile of red blood cells
