

# **Test The Potency Of Guava Leaf And Banyan Leaf Extract On Increasing Hemoglobin In Mice**

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**Abstract:** Guava leaf plants (*Psidium guajava*) and banyan leaf plants (*Ficus benjamina*) contain compounds that include polyphenols, flavonoids, carotene, tannins, and iron which have the potential to increase hemoglobin levels and prevent anemia. Research has been carried out with the aim of observing the effect of banyan leaf extract and guava leaf extract on hemoglobin levels in the blood of mice. The administration of banyan leaf extract and guava leaf extract was carried out for 14 consecutive days in mice with the same dose of 300 mg/kg/day. The results showed that banyan leaf extract could increase hemoglobin levels by 40.36% while guava leaf extract increased by 45.79%. So it can be concluded that the administration of guava leaf extract and banyan leaf is proven to increase haemoglobin levels.

## **1 INTRODUCTION**

Anemia is a global health problem that deserves attention, especially in developing countries such as Indonesia. It is estimated that about 1/3 of the world's population suffers from anemia (Kusnadi, 2021). The prevalence of anemia in Indonesia is quite high. The reason is according to the Indonesian Ministry of Health (2018) that the prevalence rate of anemia in adolescents aged 15-24 years is 32%. The proportion of anemia in women (27.2%) is higher than in men (20.3%) (Fadila & Kurniawati, 2018). According to the RI Health Ministry Regulation Number 25 of 2014, adolescents are residents with an age range of 10-18 years (Ministry of Health RI, 2015)

Anemia is a decrease in hemoglobin levels, erythrocyte count, and hematocrit so that the number of erythrocytes and/or circulating hemoglobin levels cannot fulfill its function to provide oxygen to body tissues. Usually anemia is characterized by a decrease in hemoglobin levels of less than 13.5 g/dL in adult men and less than 11.5 g/dL in adult women et al., 2014; Kusnadi, 2021). Causes of anemia, namely: inadequate intake, loss of red blood cells caused by trauma, infection, chronic bleeding, menstruation, and decreased or abnormal cell formation, such as:

hemoglobinopathy, thalassemia, hereditary spherocytosis, and deficiency of glucose 6 phosphate dehydrogenase (Balitbangkes RI, 2018)

Over time, the use of herbs as traditional medicine is now starting to increase in demand. This is because treatment with traditional ingredients is cheaper and considering that Indonesia has a high potential of medicinal plants, so it is not difficult to obtain. Some examples of plants used as traditional medicine are guava leaves and banyan tree leaves. Guava plants, including the Myrtaceae family, mainly grow in countries with tropical and subtropical climates, pink guava varieties have maximum medicinal value, one of the benefits for health is as an antidiarrheal (Purwanto & Saputro, 2022).

Guava leaf extract can be used as a cough medicine, diarrhea, canker sores, and some swollen gums wounds, the fruit is rich in vitamins A, C, iron, phosphorus and calcium and minerals, guava has a high content of organic and inorganic compounds, secondary metabolites, such as antioxidants, polyphenols, antiviral compounds, anti-inflammatory compounds, guava leaves contain many compounds that act as fungistatic and bacteriostatic (Naseeret al., 2018).

Guava leaves (*Psidium guajava* Linn.) are known to have an effect in increasing blood hemoglobin levels. Guava has compounds that can increase hemoglobin levels in the blood, including: iron, copper and phosphorus (Fitriany et al, 2021). In addition, the banyan plant also contains iron. Iron is an indispensable precursor in the formation of hemoglobin and red blood cells (erythrocytes) (Mardi, 2017). Banyan leaves (*Ficus benjamina* L.) contains flavonoids, cinnamic acid compounds, lactose, caffeic acid, and stigmasterols which affect pharmacological activities such as antiviral, antibacterial, antioxidant, anti-inflammatory (Flowers & Fernandez, 2021). In addition, plants surnamed *Ficus* contain lots of vitamins, secondary metabolites and minerals that are considered to help increase Hb levels in the blood because they are useful in the biological activities of living things (Nugraha & Mulyani, 2020). This study aims to determine the effect of guava leaf extract (*Psidium guajava* Linn.) and banyan leaf on hemoglobin levels.

## 2 METHODS

The tools used in this practicum are cage + drinking container, glass beaker, analytical scale, 2.5 ml syringe, digital scale, 50 ml Eppendorf, surgical instrument, mask, gloves, syringe, needle sonde, HBCU Accu Check, HB strip 48, Microscope, Object glass, Cover glass.

The materials used in this practicum are mice, banyan leaf extract, guava leaf extract, NaCl, Aquades, Giemsa.

The study was conducted using a completely randomized experimental design method using DDY mice aged 2-3 months weighing 20-30 grams. Mice were treated with guava leaf extract and banyan leaf extract at a dose of 300 mg/kgBW for 14 days. The Hb level was tested by taking the blood of mice from the liver of mice and then put into an Eppendorf tube then added 0.05 ml of EDTA and tested using Easy Touch. The results of the treatment will be compared with the control treatment using distilled water to see changes in HB levels in mice.

## 3 RESULTS

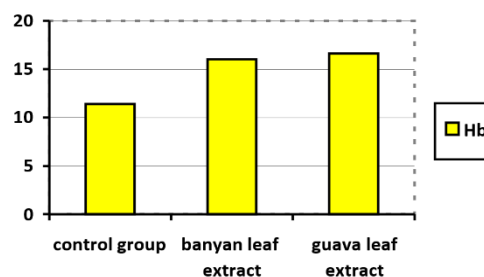


Figure 1. Graph of the iron content of mice in each control treatment group with distilled water, extract guava leaves, and banyan leaf extract

From the graph above, it can be seen that the highest increase in anemia levels was in the guava leaf extract treatment. Hemoglobin levels in DDY mice given guava leaf extract obtained the highest result as many as 16.62. This result was higher than the aquadest treatment which resulted in HB levels of 11.4. From these results there was an increase of 45.79%. Meanwhile, the results of measuring hemoglobin levels in mice treated with banyan extract increased from normal mice (control treatment) by 40.36%, from 11.4 to 16.00.

## 4 DISCUSSIONS

An increase in hemoglobin levels was also found in Arifin .'s study et al.(2013) regarding the Effect of Red Guava (*Psidium guajava* L.) Juice on the Number of Erythrocytes, Hemoglobin, Platelets and Hematocrit in White Mice. The results showed that the administration of red guava juice could affect the number of erythrocyte cells, hemoglobin and hematocrit in mice which could vary, but after being tested with statistics showed that there was no significant difference in the effect of dose and duration of administration of guava juice on erythrocyte cells in experimental animals.

Anemia occurs because the decrease in hemoglobin in the blood does not fulfill its function, it occurs due to a lack of oxygen in the blood. Decreased hemoglobin can be caused by a state of the body that lacks iron. Iron is important because it is used for protein synthesis (Fitriany and Saputri, 2018). Iron is a vital trace element that is needed by the body for the formation of

hemoglobin, myoglobin, and various enzymes (Maulina and Amalasar, 2018).

In addition to iron, the flavonoid content in plants is also able to increase Hb levels in the blood. Flavonoids are found in guava leaves and banyan leaves. Guava leaves have flavonoid, phenolic, isoflavonoid compounds, gallic acid, catechins, epicatechins, rutin, naringenin, kaempferol which are hepatoprotective, antioxidant, anti-inflammatory, anti-spasmodic, anticancer, antimicrobial, antihyperglycemic. analgesic (Girsanget al., 2020). In addition, guava leaves also contain iron (Naseer et alet al.,2018). So it has the potential to increase hemoglobin levels and prevent anemia. banyan leaves (*Ficus benjamina*L.) contains flavonoids, cinnamic acid compounds, lactose, caffic acid, and stigmasterols which affect pharmacological activities such as antiviral, antibacterial, antioxidant, anti-inflammatory (Flowers & Fernandez, 2021). In addition, plants surnamed *Ficus* contain lots of vitamins, secondary metabolites and minerals that are considered to help increase Hb levels in the blood because they are useful in the biological activities of living things (Nugraha & Mulyani, 2020).

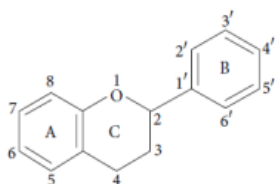


Figure 2. Flavonoid  
Course: Kumar, S., & Pandey (2013)

These flavonoids can increase erythropoiesis (the process of formation of erythrocytes) in the spinal cord. Flavonoids are compounds that act as antioxidants, namely oxidation attacks. Flavonoids are lipophilic so that they are able to bind to the erythrocyte cell membrane and function as a protector against free radicals (Sundaryono, 2011; Restutiet al., 2020).

The flavonoids contained in the leaf extract given orally will undergo a digestive process. Then it will be absorbed by the digestive wall. Then it will be circulated through the blood. These flavonoids in the blood circulation will stimulate the kidneys in plasma globulin cells to secrete the hormone erythropoietin. secrete the hormone erythropoietin. Erythropoietin is a glycoprotein hormone found in

the blood. The hormone erythropoietin circulating in the blood vessels will stimulate the bone marrow to increase the formation of red blood cells. Bone marrow primordial stem cells will form new hemocytoblasts continuously. Hemocytoblasts first form basophilic erythroblasts which begin to synthesize hemoglobin (Aini et al, 2022).

## 5 CONCLUSIONS

From the results of this study it was known that guava leaf extract could increase blood Hb by 45.79% from normal Hb of mice (treatment with Aquades) while banyan extract increased from normal mice (control treatment) by 40.36% from normal Hb of mice (treatment with Aquades). So that guava leaf extract is the extract with the highest increase in Hb levels compared to banyan leaf extract.

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