

Utilization of Butterfly Pea Instant Powder as an Antihypertension Health Drink in Dungaliyo Village, Gorontalo District

Prisca Safriani Wicita, Arlan K. Imran, and Fitriah Ayu Magfirah Yunus^{a)}

Pharmacy Department, Health Polytechnic of Gorontalo, Gorontalo, Indonesia

^{a)}Corresponding Author: ayumagfirah1603@gmail.com

Abstract

Hypertension is a state of systolic blood pressure 140 mmHg and diastolic 90 mmHg. This non-communicable disease has become a problem around the world because of its increasing prevalence and association with cardiovascular disease, stroke, and kidney disease. Gorontalo Regency is a district with the highest number of hypertension sufferers, and based on research data, one of the survey areas for hypertension sufferers is in the Dungaliyo Village area. This community service aims to apply research results related to the use of natural ingredients in the form of butterfly pea flower (*Clitoria ternatea* L.), which has many benefits, one of which is antihypertensive activity. The application was realized in the form of distribution of butterfly pea flower instant powder and training for cadres and community groups related to the procedure for making butterfly pea flower instant powder. This is to increase the level of health and skills of the people of Gorontalo in general as well as the awareness of cadres and community groups where community service is carried out in particular. This community service activity has been carried out in accordance with the objectives and methods planned in three stages. Stage 1: Coordination with the Head of Dungaliyo Village, stage 2: Pretest understanding of hypertension and butterfly pea flowers, measurement of blood pressure, and dissemination of the use of butterfly pea powder as an antihypertensive health drink, stage 3: socialization of butterfly pea flower cultivation, distribution of seeds, measurement of blood pressure, and posttest. This community service activity obtained the results of an evaluation of community understanding, which increased from 50% to 90%, and a decrease in blood pressure, with the percentage of people with high blood pressure decreasing from 25% to 20%.

Keywords: Antihypertension, Butterfly Pea, Dungaliyo Village, Health Drink

INTRODUCTION

Hypertension is a serious problem and is often found in society, both in developed and developing countries, especially in Indonesia (Oktaviarini, Hadisaputro, Chasani, Suwondo, & Setyawan, 2019). Hypertension is a state of increased blood pressure, both systolic and diastolic, that is equal to or greater than 140/90 mmHg. Hypertension is a risk factor for stroke, with a risk 6.905 times greater than that of those without hypertension. Hypertension can cause rupture or narrowing of the blood vessels in the brain. If the blood vessels of the brain rupture, bleeding will occur in the brain, and if the blood vessels in the brain narrow, the blood flow to the brain will be disrupted and brain cells will die (Masriadi, 2016; Suntara, Roza, & Rahmah, 2021).

According to data from the World Health Organization (WHO) in 2015, there are 1.13 billion people in the world who suffer from hypertension, meaning that 1 in 3 people in the world are diagnosed with hypertension. The number of people with hypertension is expected to continue to increase every year; it is estimated that it will reach 1.5 billion people in the world by 2025. It is estimated that every year there will be 9.4 million people who will die from hypertension and its complications (Tarigan, Lubis, & Syarifah, 2018).

In 2018, the incidence of hypertension occupied the top position as a non-communicable disease, namely 185,857 cases, followed by type 2 diabetes mellitus and obesity, which based on 2013 data with an incidence rate of 25.8 increased to 34.1 in 2018 (Ministry of Health Indonesia, 2018a). Gorontalo Province is one of the provinces in Indonesia with the highest prevalence of hypertension based on doctors' diagnoses, which continues to

increase and is ranked 6th in Indonesia. According to data in the Gorontalo province area, the prevalence of hypertension based on doctors' diagnoses in the population of Gorontalo province aged 18 years is 10.1%, with a total of 7,155 sufferers (Ministry of Health Indonesia, 2018a). Based on these data, research shows the highest incidence rate in Gorontalo District, with an average number of 2,275 sufferers (Ministry of Health Indonesia, 2018b).

The Dungaliyo Health Center, which is located in Dungaliyo District, Gorontalo Regency, is a health service center that serves people of various ages and with various health problems. According to preliminary data for 2017, the number of hypertension cases at the Dungaliyo Health Center was 1077 people with hypertension aged 20–60 years, both women and men. Based on the data, the number of hypertensive patients found that in January 2017 there were 63 patients, in February there were 98 patients, in March 121 patients, in April 81 patients, in May 44 patients, in June 33 patients, in July 111 patients, in August 95 patients, in September 33 patients, in October 152 patients, in September 100 patients, and in December there were 146 patients. From these data, the number of hypertensive patients was 387 (35.9%), while there were 620 women suffering from hypertension (57.5%). Meanwhile, in 2018, according to data for March and April, there were 192 new cases of hypertension (Kadir, 2019).

The data above shows that it is necessary to take action to reduce the prevalence of hypertension in Gorontalo, both for prevention and treatment, especially in the Dungaliyo Village area in Gorontalo Regency. This prevention and treatment can be done by utilizing natural resources such as medicinal plants, known to the public as herbal therapy. Herbal therapy is an alternative used by the community, where herbal therapy using plants as medicine is considered safer and less risky than synthetic drugs (Mutiar PI, Nurdiana, & Utami, 2015). One of the plants that has effectiveness as an antihypertensive is butterfly pea flower (*Clitoria ternatea* L.) (Abdullah Muzi Marpaung, 2020).

Butterfly pea flower (*Clitoria ternatea* L.) is one of the plant sources with relatively high levels of polyphenols, so it has the potential to provide health benefits for humans (Kamkaen & Wilkinson, 2009; A. M Marpaung, Andarwulan, Hariyadi, & Faridah, 2018; Abdullah Muzi Marpaung, 2020; Rabeta & An Nabil, 2013). The bioactive components in butterfly pea flower that are thought to have functional benefits come from various groups of phytochemical compounds, namely phenols (flavonoids, phenolic acids, tannins, and anthraquinones), terpenoids (triterpenoids, tocopherol saponins, phytosterols), and alkaloids (Abdullah Muzi Marpaung, 2020). One gram of dry butterfly pea flower extract contains an average of 11.2 mg of flavonoids equivalent to catechins (Chayaratanasin, Barbieri, Suanpairintr, & Adisakwattana, 2015). Flavonoids 25.8 mg quercetin equivalent per gram of extract (Singh, 2018). Flavonoids affect the work of the angiotensin converting enzyme (ACE), which will inhibit the conversion of angiotensin I to angiotensin II, thereby inhibiting aldosterone release. Aldosterone will affect the kidneys' ability to retain sodium and water; if aldosterone expenditure is inhibited, then more water is removed from the body and blood pressure will decrease (Almatsier, 2001; Nadila, 2014). Butterfly pea flowers also contain anthocyanins, which have antihypertensive activity (Abdullah Muzi Marpaung, 2020).

Some of the results of this study indicate that the butterfly pea flower has potential as an antihypertensive that can be developed, so as a form of concern for the academic community of the Pharmacy Department, the Gorontalo Ministry of Health Polytechnic has conducted formulation research and tested the hypertensive activity of instant butterfly pea flower powder (*Clitoria ternatea* L.) on reducing blood pressure. Blood in white male rats (*Rattus norvegicus*) induced with NaCl. This research used various concentrations of butterfly pea flower as the active substance (F1 (1%), F2 (4%), F3 (8%), and F4 (without active substance)) and obtained F3 as the best formula with a reduction percentage of 25.02%. The results of the instant butterfly pea formulation can be used to reduce the incidence of

hypertension in Gorontalo, starting in the Dungaliyo Village area with a high prevalence of hypertension.

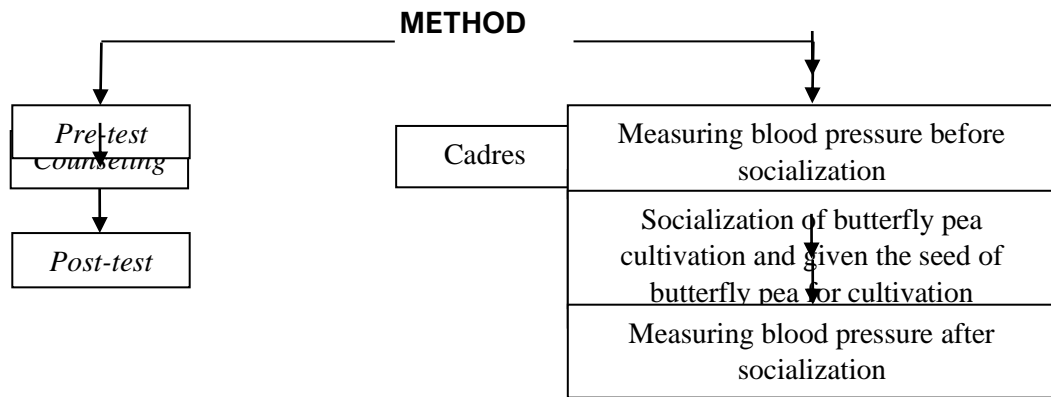


Figure 1. Community service activities

Table 1. Instant Powder Formula Telang flower (*Clitoria ternatea* L)

Composition	Amount
Butterfly Pea Powder	1.6 g
Glucose	20 g
Na CMC	0.2g
Citric Acid	0.4g

RESULTS

Increasing the understanding of the Dungaliyo Village Community about hypertension, the use of butterfly pea flowers, and the processing of butterfly pea flowers into instant antihypertensive health drink powder. The pretest results show a value of 50% for community understanding, which increases in the posttest to a value of 90%. The description of the pretest and posttest results is as follows:

Age demographics.

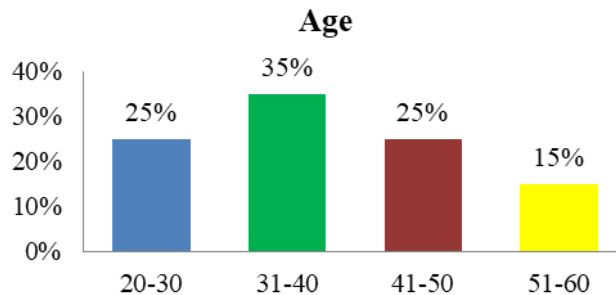


Figure 1. Age Demographics

Based on the data diagram in Figure 1, it can be seen that the age characteristics of the 20 people participating in community service activities ranged from 20–30 years of age at 25%, 31–40 years at 35%, 41–50 years at 25%, and 51–60 years at 15%.

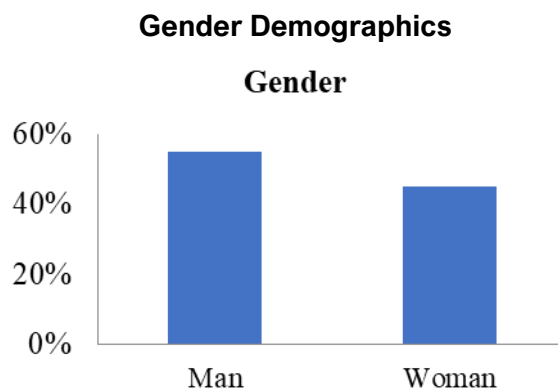


Figure 2. Gender Demographics

Based on the data diagram in Figure 2, it can be seen that the gender characteristics of the 20 people who participated in community service activities were 55% male and 45% female.

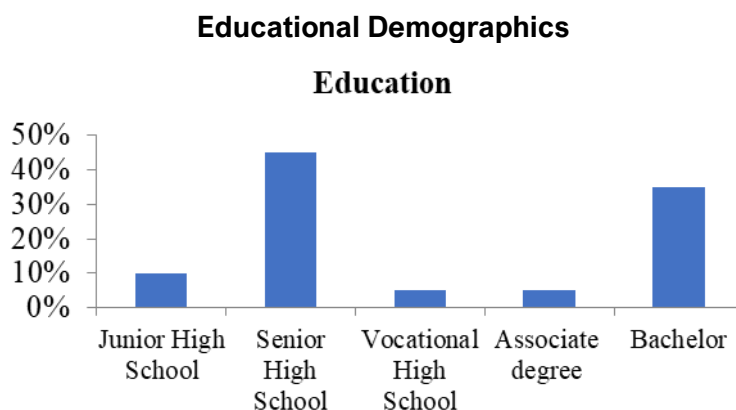


Figure 3. Education Demographics

Based on the data diagram in Figure 3, it can be seen that the educational demographics of the 20 people who participated in community service activities were junior high school, senior high school, vocational high school, associate degree, and bachelor's education, respectively, with scores of 10%, 45%, 5%, 5%, and 35%. So based on the data, it can be seen that education is dominated by senior high school and bachelor's graduates.

Community Understanding

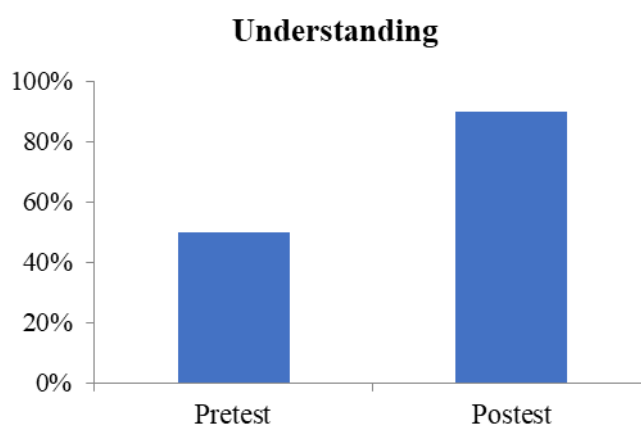


Figure 4. Understanding based on Pretest and Posttest

Based on the data diagram in Figure 4, the level of community understanding before and after socialization increased from 50% to 90%. This shows that the socialization carried out succeeded in increasing the understanding of the people of Dungaliyo Village. Decreasing

people's blood pressure before consuming butterfly pea powder and after 1 week of consuming instant butterfly pea powder once a day.

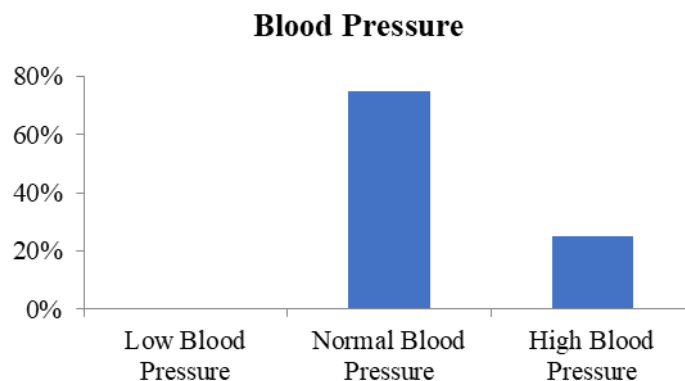


Figure 5. Blood Pressure in Stage 2 Community Service

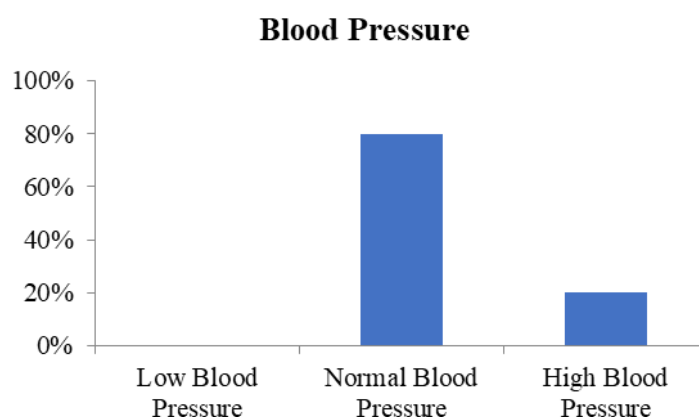


Figure 6. Blood Pressure in Stage 3 Community Service

Based on the data diagrams in Figure 5 and Figure 6, high blood pressure in 20 people in stages 2 and 3 decreased from 25% to 20%.

DISCUSSION

The community service activities carried out in Dungaliyo Village are an effort to increase understanding and awareness and provide information and skills needed to prevent and manage hypertension by utilizing natural ingredients, namely butterfly pea flowers. Education about hypertension uses the socialization method in the form of presentations and the distribution of leaflets because it is proven to be more effective in increasing knowledge (Prawesthi et al., 2021).

Before the socialization began, the participants were given a pre-test to find out how well they understood matters related to hypertension and butterfly pea flowers. A pre-test by distributing questionnaires to the target group was carried out prior to the socialization activity to find gaps in community knowledge about a topic (Hartati et al., 2020). The results obtained showed that the average pre-test value of the participants before socialization was carried out was 50%. This means that most of the participants did not understand matters related to hypertension and butterfly pea flowers. After the pretest was carried out, the blood pressure measurement was continued by several people before the socialization was carried out, with the result that around 25% of the participants had hypertension.

The early stages of socialization were carried out by exposing material related to hypertension and using butterfly pea flowers, which were made into instant powder, which was the result of research and had been tested for its effectiveness in mice. Furthermore, the second phase of activities was carried out again, namely the presentation of material on butterfly pea flower cultivation and the distribution of seeds so that they could be cultivated

by the community and could be directly processed and consumed to prevent diseases, especially hypertension. After the exposure, the participants were given a posttest, and the results obtained increased from the pretest, which was 90%, and continued to measure blood pressure, with the result that there was a decrease from 25% to 20% of participants experiencing hypertension.

CONCLUSIONS and RECOMMENDATIONS

Based on the description of the implementation of the community service program, it can be concluded that the activity program was implemented well with 100% realization for an output target of 90% because the main target is still in process. The actual achievements of the activity program include increasing the understanding of the people regarding the use of butterfly pea flower powder as an antihypertensive health drink, reducing high blood pressure from 25% to 20%, and increasing community skills in making antihypertensive health drinks from butterfly pea flowers.

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