

# THE PROFILE CONTENT OF TOTAL PHENOLS, FLAVONOIDS AND ANTIOXIDANTS ON RESULTS OF FREEZE DRY KAMOJANG GOLDEN BERRY (PHYSALIS PERUVIANA): THE COMPREHENSIVE STUDY OF HEALTH POTENTIAL

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## ABSTRACT

*A healthy and balanced diet, also adequate nutrition helps reduce the rate of immune suppression in HIV-infected individuals and promotes adherence to treatment. In contrast, inadequate nutrition and food insecurity tend to accelerate disease progression and are associated with poorer treatment outcomes for PLHIV. Golden berry is scientifically known as Physalis peruviana. This fruit is the size of a marble and is yellowish in color. This study used an extract trial using a RAL design (completely randomized design). The test was carried out at the Spice and Medicinal Plants Laboratory, Bogor, West Java. The results showed that the Kamojang Golden Berries (GBK) which grow at Daniel's Farm, Mount Kamojang, Kamojang Regency, West Java, were proven to contain compounds: Triterpenoids, Saponins, and Alkaloids. So that the three ingredients can support the increase in the body's immune system. GBK fruit also contains an antioxidant content of 2282 ppm and antioxidant compounds: Flavanoids which can support an increase in CD4 count in HIV/AIDS patients. GBK fruit extract can be used as an alternative therapy in overcoming the problem of decreased immune system, especially CD4 count which often occurs in HIV/AIDS patients.*

**Keywords:** *golden berry kamojang, HIV/AIDS, immunity system*

## INTRODUCTION

Much progress has been made over the last 30 years to mitigate the impact of the human immunodeficiency virus (HIV/AIDS) including driving biomedical breakthroughs, particularly in terms of prevention and reduction of the risk of contamination. As HIV progresses into AIDS, nutritional needs in terms of protein, micronutrients and energy increase. Unfortunately, malnutrition is a common problem among people living with HIV (PLHIV). Inadequate nutrition and food insecurity tend to accelerate disease progression and are associated with poorer treatment outcomes for PLHIV. For example, this condition has been associated with lower CD4 counts and

decreased immunity, increased risk of transmission and metabolism, increased risk of infection, increased risk of death, poor adherence to HAART and reduced quality of life (Sidibe et al, 2018).

The series of inflammatory reactions caused by HIV infection increases basal metabolism and general energy expenditure. This leads to vulnerability to malnutrition for people living with HIV (PLHIV), especially for those with decreased appetite or metabolic disorders, or for those who experience food scarcity in resource-limited settings. With ART, nutritional status often improves because good immunometabolism is responsible for an effective ART outcome. Therefore, it is necessary to provide ART to patients in adequate nutritional conditions.

Although there is little information on food insecurity and HIV, there is some evidence that food insecurity increases a woman's risk of exposure to HIV. Food insecurity is defined as limited or uncertain access to sufficiently nutritious and safe food for an active and healthy life. The study by Nyamathi, Sinha, Ganguly, Ramakrishna, Suresh & Carpenter (2013), conducted in sub-Saharan Africa showed that severe food insecurity was associated with reduced condom use and with an increased incidence of symptoms that may indicate sexually transmitted diseases among sexually active women. These findings suggest that interventions targeting sexual risk reduction behaviors are unlikely to be optimally effective if food insecurity is not taken into account.



Golden Berry (*Physalis peruviana*), which is also called by many names such as Cape Gooseberry, ground cherry, Chinese lantern or what is known in Indonesia as *Ciplukan*. This plant is a member of the physalis family, a group of plants close to tomatoes. Not much is known that in Indonesia, the Golden Berry has been successfully cultivated and is growing rapidly in Kamojang, South Bandung (a very different species from the existing *Ciplukan*).

Golden berry contains Phytochemicals which have physiological effects on humans due to the antioxidant, antibacterial and antifungal activities of flavonoids, terpenoids, vitamins and alkaloids. So far there has been no research on the benefits of Golden berry for enhancing the immune system in HIV/AIDS patients.

Cape Goldenberry, later we call it CGB, is a crop with economic benefits and is marketed in Egypt as a ready-to-eat summer fruit as a comfort food. These phytochemicals have physiological effects on humans due to the antioxidant, antibacterial, and antifungal activities of flavonoids, terpenoids, vitamins, and alkaloids. Atoxins (AFs) are the highest health hazards for humans and animals, this can cause mutagenic effects and carcinogenesis through feed and food contamination. Foodstuffs contaminated with toxigenic fungi, which increase the excretion of mycotoxins in food commodities. Compared to other contaminants, AF is an excellent source of exposure to chronic diseases such as cancer especially atoxin B1 (AFB1), related to the presence of mycotoxins in body fluids. This study aims to clarify the potential impact of CGB as an anticancer agent against flatoxin G1 (AFG1) and clarify its ability to reduce the proportion of pre-carcinogenic compounds represented by AF in light of the bioactive substances involved in this plant.

Recent research conducted by Badr & Naeem (2019) where CGB was selected for its main bioactive molecules, dried under vacuum, milled and sieved. The impact of CGB on harmful Aflatoxin was evaluated using experimental rats. Estimated blood and biochemical parameters, liver and kidney function, liver enzymes, and serum lipids. The results showed an increase in feeding efficiency, weight gain, and blood parameters for rats with CGB fortified diet. However, this research has never been done in humans.

The hypothesis that was enforced in this study was that there was antioxidant activity in golden berry extract which could increase the CD4 count of HIV patients. This study aims to determine the benefits of Kamojang Golden berry fruit extract, hereinafter referred to as GBK, for increasing the immunity of HIV/AIDS patients in the Jakarta city area. This general objective is translated into specific objectives, namely identifying the content of freeze-dried GBK fruit extract which supports the increase in CD4 count, identifying the content of GBK fruit extract which supports the improvement of the body's immune system, and identifying the antioxidant content present in freeze-dried GBK extract.

## METHOD

This research is a quantitative study using a completely randomized design. In testing the effectiveness of golden berry extract using the RAL research design (Completely Randomized Design) with 6 treatments 4 repetitions. Phytochemical tests were carried out to determine the presence or absence of bioactive components in the methanol extract of Golden berry fruit. which has the highest antioxidant activity. Phytochemical tests include alkaloid tests, steroid/triterpenoid tests, flavonoids, saponins, phenol hydroquinone. Testing of antioxidant activity with the DPPH radical scavenging method refers to the procedures of Ahmad, et. al., (2012).



## RESULTS AND DISCUSSION

### Identified the content of GBK fruit extract which supports the increase in CD4 count

Based on the research results of Jalil, Adam, Djawad, Seweng, Halim, & Adriani (2017) stated that HIV infection is characterized by a decrease in the number of CD4 cells, which results in a gradual decrease in immunity. Related to the process of oxidative stress which is defined as an imbalance between the oxidant and antioxidant systems, the oxidant systems are various enzymatic (superoxide dismutase, catalase, glutathione peroxidase etc.) and non-enzymatic (carotenoids, tocopherols, ascorbate, bioflavonoids, bilirubin, uric acid etc.) Human serum is useful for avoiding the occurrence of HIV-1 replication secondary to cell production of ROS

(superoxide anions, hydroxyl radicals, hydrogen peroxide etc.) with pro-inflammatory cytokine oxidant effects and/or polymorphonuclear leukocyte activation..

Based on the results of the GBK fruit carotenoid qualitative test, carotenoids were found to be **20.10 ppm**. This means that GBK fruit has antiviral, anti-inflammatory and anticancer effects.

Also based on the qualitative test results of the freeze dried extract of GBK fruit, an anthocyanin result of **4.87 mg/100 g**, means that GBK fruit can also act as an anti-diabetic, anti-hypoglycemic, anti-hypertensive, anti-cancer, anti-inflammatory, neuroprotectant, anti-mutagenic, anti-cataract, anti-arthritis, anti-infertility, anti-microbial, anti-aging, preventing liver dysfunction and anti-obesity.

### **The content of Golden berry fruit extract which supports the improvement of the body's immune system.**

Based on research conducted by Haryanti & Sunarni (2019) the destruction of proteins surrounding the HIV virus is useful for preventing the attachment of HIV particles to receptor cells (CCR5 & CXCR4), so that HIV viral RNA is blocked at the entrance and viral proliferation can be suppressed. A reduced number of CD4+ T lymphocytes in the human body indicates a reduction in white blood cells that play a role in the human body's defense system, thus increasing a person's probability of getting opportunistic infections secondary neoplasms, and other neurological manifestations.

The results of the Flavanoid qualitative test from the freeze dried extract of GBK fruit were found to have Flavanoids of **19.27 mg/100 gr**, meaning that GBK fruit contains antioxidant compounds. Based on the results of the GBK fruit carotenoid qualitative test, carotenoids were found to be **20.10 ppm**. This means that GBK fruit has antiviral, anti-inflammatory and anticancer effects. Meanwhile, based on the qualitative test results of the freeze dried extract of GBK fruit, the Phenol yield was **217.74 mg GAE/100 gr**, meaning that GBK fruit acts as an anti-aging and free radical scavenger.

### **Identified the antioxidant content contained in Golden berry extract**

Protection of the body from free radical attacks with antioxidant substances, these antioxidants function to inhibit free radical reactions with other molecules, stabilize free radicals by complementing the lack of electrons from free radicals so as to inhibit chain reactions.

Based on the results of the Flavanoid qualitative test from the freeze dried extract of GBK fruit, it was found that Flavanoids were **19.27 mg/100 gr**, meaning that GBK fruit contains antioxidant compounds. Also from the results of the GBK fruit content test, it was found that the antioxidant content of GBK fruit was **2282 ppm**, meaning that GBK fruit is one of the **natural** antioxidants.

## CONCLUSION

Kamojang Golden berry (GBK) fruit that grows on Kamojang, South Bandung, West Java, is proven to contain compounds: Carotenoids, which have antiviral, anti-inflammatory and anticancer effects; and Anthocyanins, which have effects as anti-diabetic, anti-hypoglycemic, anti-hypertensive, anti-cancer, anti-inflammatory, neuroprotectant, anti-mutagenic, anti-cataract, anti-arthritis, anti-infertility, anti-microbial, anti-aging, preventing liver dysfunction and anti-obesity. So that the three ingredients can support the increase in the body's immune system. GBK fruit also contains antioxidants and antioxidant compounds: Flavanoids which can support an increase in CD4 count in HIV/AIDS patients.

GBK fruit extract can be used as an alternative therapy in overcoming the problem of decreased immune system, especially CD4 count which often occurs in HIV/AIDS patients.

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