

The Effect of Butterfly Pea (*Clitoria ternatea*) Boiled Infusion on Blood Glucose Levels Among Elderly with Diabetes Mellitus

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Abstract

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to impaired insulin secretion or action. This condition is common among the elderly due to physiological decline. This study aimed to determine the effect of butterfly pea (*Clitoria ternatea*) boiled infusion on blood glucose levels among elderly patients with diabetes mellitus in Dusun 1, Sei Litur Tasik Village, Sawit Seberang District, Langkat Regency. The study employed a pre-experimental design with a one-group pretest-posttest approach. Blood glucose levels were measured before and after consuming the butterfly pea infusion for seven consecutive days. The results showed a significant decrease in blood glucose levels after the intervention, with a p-value < 0.05. These findings indicate that butterfly pea has potential as a non-pharmacological complementary therapy to help regulate blood glucose levels in elderly individuals with diabetes mellitus. Therefore, butterfly pea infusion can serve as a natural, affordable, and safe herbal alternative therapy.

Keywords: Butterfly Pea, *Clitoria ternatea*, Elderly, Diabetes Mellitus, Blood Glucose Level.

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Introduction

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by elevated blood glucose levels due to impaired insulin secretion or insulin action [1]. This condition frequently occurs among the elderly who experience physiological decline, such as reduced muscle strength, impaired balance, and decreased vision and hearing ability [2]. These physiological changes affect the elderly's ability to adapt and increase their risk of developing degenerative diseases, one of which is type 2 diabetes mellitus — the most common type found among older adults [3].

Globally, the prevalence of DM continues to rise. Data from the International Diabetes Federation (IDF) in 2021 reported that approximately 463 million people worldwide live with diabetes, and this number is projected to increase to 700 million by 2045 [4]. In Southeast Asia, Indonesia ranks third with a prevalence of 11.3%, and seventh globally in terms of the highest number of diabetes cases [5]. According to the Indonesian Basic Health Research (Riskesdas) in 2020, there are about 10 million people with diabetes and 17.9 million individuals at high risk of developing the disease [6].

Diabetes mellitus among the elderly requires comprehensive management through both pharmacological and non-pharmacological approaches. Pharmacological therapy typically involves insulin or other glucose-lowering medications, but long-term use can cause side effects and high treatment costs [7]. Therefore, alternative non-pharmacological therapies using natural-based materials are needed as safer, more affordable, and accessible options.

One of the plants with promising potential is the butterfly pea flower (*Clitoria ternatea*), which contains bioactive compounds such as anthocyanins and flavonoids that act as antioxidants, antidiabetic, and anti-inflammatory agents [8]. Several studies have demonstrated that extracts or infusions of *Clitoria ternatea* can lower blood glucose levels and improve insulin sensitivity [9].

However, research on the effectiveness of *Clitoria ternatea* boiled infusion in reducing blood glucose levels among elderly patients with diabetes remains limited, particularly in rural community settings. Therefore, this study aims to analyze the effect of *Clitoria ternatea* boiled infusion on blood glucose levels among elderly individuals with diabetes mellitus in Dusun 1, Sei Litur Tasik Village, Sawit Seberang District, Langkat Regency.

Literature Review

Diabetes Mellitus (DM) is a metabolic disease characterized by elevated blood glucose levels (hyperglycemia) resulting from impaired insulin secretion or action. DM is classified into four types: type 1 DM, type 2 DM, gestational DM, and other specific types. Type 2 DM is the most common among the elderly due to decreased insulin sensitivity and inadequate insulin production. This condition is further aggravated by genetic factors, unhealthy lifestyles, and high-calorie diets (Perkeni, 2021; WHO, 2021).

The main risk factors for type 2 DM include obesity, physical inactivity, aging, and oxidative stress. Physiologically, type 2 DM is characterized by insulin resistance and dysfunction of pancreatic β -cells, leading to increased blood glucose levels. If not properly managed, this condition can result in acute complications such as hypoglycemia and diabetic

ketoacidosis, as well as chronic complications including nephropathy, retinopathy, neuropathy, and coronary heart disease (Astuti et al., 2022).

In addition to pharmacological therapy, blood glucose control can also be achieved through non-pharmacological treatments using herbal plants with antidiabetic effects. One such plant proven to possess antidiabetic properties is the butterfly pea flower (*Clitoria ternatea*). This plant contains bioactive compounds such as flavonoids, anthocyanins, saponins, and phenolics, which act as antioxidants, antidiabetic, and anti-inflammatory agents (Hariadi et al., 2022; Purba, 2020).

The active compounds in *Clitoria ternatea* work by enhancing insulin sensitivity and reducing blood glucose levels through increased glucose metabolism and inhibition of the α -glucosidase enzyme. Studies by Srinivas et al. (2020) and Marpaung (2020) showed that consuming boiled butterfly pea flower infusion significantly reduces blood glucose levels and is safe for consumption without severe side effects.

Thus, *Clitoria ternatea* has great potential as a complementary therapy in diabetes management, particularly among the elderly who experience resistance to synthetic medications or prefer natural and more affordable herbal treatments.

Research Methodology

This study employed a quantitative method with a pre-experimental design using a one-group pretest-posttest approach. The aim was to determine the effect of butterfly pea flower (*Clitoria ternatea*) infusion on blood glucose levels (BGL) among elderly individuals with diabetes mellitus in Dusun I, Sei Litur Tasik Village, Sawit Seberang District, Langkat Regency.

1. Population and Sample

The population consisted of all elderly individuals with diabetes mellitus residing in Dusun I, Sei Litur Tasik Village, totaling 52 people. The sampling technique used was total sampling, meaning that the entire population was included as research participants.

2. Inclusion and Exclusion Criteria

Inclusion criteria included elderly individuals with blood glucose levels >200 mg/dL, residing in the study area, and willing to participate as respondents. Exclusion criteria included participants who were unwilling to complete the intervention or failed to finish the study.

3. Research Variables

- a. Independent Variable: Administration of butterfly pea flower (*Clitoria ternatea*) infusion.
- b. Dependent Variable: Blood glucose levels (BGL) among elderly patients with diabetes mellitus.

4. Research Procedure

The intervention involved administering 200 ml of butterfly pea flower infusion daily for seven consecutive days. The infusion was prepared by steeping five fresh petals or one gram of dried butterfly pea flower in boiling water and consumed warm. Blood glucose levels were measured twice:

- a. Before the intervention (pre-test)
- b. After the intervention (post-test)

Measurements were taken using a calibrated digital glucometer.

5. Data Analysis

Data were analyzed using the Paired Sample t-test to determine the difference in blood glucose levels before and after the intervention. A p-value of less than 0.05 was considered statistically significant.

6. Research Ethics

This research received ethical approval from the Faculty of Health Sciences, Universitas Putra Abadi Langkat. All respondents signed an informed consent form prior to participation, and data confidentiality was strictly maintained.

Results

This study involved 52 elderly respondents diagnosed with type 2 diabetes mellitus residing in Dusun I, Sei Litur Tasik Village, Sawit Seberang District, Langkat Regency. The purpose of this study was to determine the effect of butterfly pea flower (*Clitoria ternatea*) boiled infusion on the reduction of blood glucose levels.

1. Blood Glucose Levels Before Intervention

The measurement results of blood glucose levels before the administration of the butterfly pea flower infusion showed that all respondents had high blood glucose levels. The average blood glucose level before treatment was 278.294 mg/dL, with a range of 250–310 mg/dL. This indicates that respondents were within the hyperglycemia category according to WHO standards (2022).

2. Blood Glucose Levels After Intervention

After the intervention, which consisted of administering butterfly pea flower infusion for seven consecutive days, the average blood glucose level of respondents decreased to 231.987 mg/dL, with a range of 190–270 mg/dL. Most respondents also reported improvement in clinical symptoms, such as reduced excessive thirst and decreased frequency of urination.

3. Statistical Analysis

The results of the statistical test using the Paired Sample t-Test showed a p-value of 0.000 ($p < 0.05$), indicating a significant difference between blood glucose levels before and after the administration of the butterfly pea flower infusion. Therefore, it can be concluded that the consumption of butterfly pea flower infusion has a significant effect on reducing blood glucose levels among elderly patients with diabetes mellitus.

Table 1. Average Blood Glucose Levels Before and After Intervention

No.	Measurement Type	Mean (mg/dL)	p-value	Description
1	Before intervention (Pre-test)	278.294	—	High glucose level
2	After intervention (Post-test)	231.987	0.000	Significant decrease

Discussion

The results of this study are consistent with the findings of Marpaung (2020) and Srinivas et al. (2020), who reported that butterfly pea flowers contain anthocyanins, flavonoids, and saponins that function as antioxidants and antidiabetic agents. These compounds help enhance insulin sensitivity and suppress excessive glucose absorption in the bloodstream. The significant reduction in blood glucose levels indicates that the consumption of butterfly pea flower infusion can serve as an effective and economical non-pharmacological complementary therapy to support the management of type 2 diabetes mellitus in the elderly.

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