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Effectiveness of insulin tea on hyperglycemia levels in climacterium age women

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Background: Indonesia has 284.4 million people, including 54.2 million women over 40 years. In Baturraden District, 9,356 women fall within this age group, entering the climacteric phase (ages 40–65). This transitional stage, marked by declining estrogen and progesterone, cessation of menstruation, and symptoms such as hot flushes, sleep disturbances, and mood changes, increases vulnerability to degenerative diseases, notably diabetes mellitus characterized by hyperglycemia.

Purpose: To determine the effectiveness of *insulin tea* administration on hyperglycemia levels in women in climacterium age.

Method: A quantitative study was employed through a case control approach with unpaired numerical comparative analysis in two groups with one measurement. With 31 participants in the treatment and control groups.

Results: There was a difference in results between before and after being given insulin tea for 7 days with an average difference of 86.39 mg/dL with a p value = <0.001.

Conclusion: Insulin tea administration is effective in controlling hyperglycemia levels.

Suggestion: This research is expected to be the foundation in efforts to use insulin plants, so that it can become a legal product and can be used by the community easily.

Keywords: Climacterium; Hyperglycemia; Hypoglycemia; Insulin Tea.

INTRODUCTION

Climacterium is a period that starts from the end of the reproductive period to the beginning of the senum which usually occurs in women aged 40-65 years. This condition is a normal transitional period and lasts several years before and after menopause (Widiastuti & Rohani, 2020). This phase consists of four stages, namely premenopause, perimenopause, menopause and postmenopause, which are characterized by decreased production of estrogen and progesterone hormones and the end of menstruation. In addition, vasomotor symptoms such as hot flushes and night sweats or excessive sweating at night also appear, sleep disorders, urogenital symptoms and mood swings. These symptoms are normal but can affect women's physical and psychosocial well-being (Sari, Fatmawati, & Rachmah, 2025).

In 2020, the global population of women aged 50 years and above reached 985 million, and this figure

is projected to rise to 1.65 billion by 2050 (Kirchengast, 2024). Within Indonesia, the total population is expected to reach 284.4 million, with women aged over 40 accounting for 54.2 million. Specifically, in Banyumas Regency, the number of women over 40 years old was recorded at 393.9 thousand (Banyumas Regency Office of Communication and Informatics, 2025). Meanwhile, in Baturraden District, the total female population amounted to 27,416, of which 9,356 were aged above 40 (Statistics Indonesia, Regency of Banyumas, 2024). At this stage of life, women typically enter the climacterium phase, a transitional period marked by physiological and psychological changes associated with aging.

After not being produced, the hormone estrogen will cause an increase in risk factors for developing degenerative diseases such as heart, hypertension, diabetes mellitus, cancer, stroke and osteoporosis. In addition, the hormones estrogen and progesterone

affect the response of the body's cells to insulin. This happens because changes in the body's hormones can trigger changes in blood sugar levels. So it can cause an unpredictable increase or decrease in blood sugar levels compared to the reproductive period (Syokumawena, Mediarti, & Agustini, 2024). If blood sugar levels are not controlled, it will increase the risk of diabetes mellitus which is characterized by hyperglycemia (Karyati & Astuti, 2016).

This statement is strengthened by research reporting that diabetic is at a higher risk in the pre- and perimenopausal periods compared to postmenopause, this occurs due to a decrease in insulin sensitivity and decreased β cell function as a result of decreased production of the hormones estrogen and progesterone during the climacterium period (Choi & Yu, 2025; Yazdkhasti, Jafarabady, Shafiee, Omran, Mahmoodi, Esmaeilzadeh, & Bakhtiyari, 2024).

The incidence of hyperglycemia can be overcome by adopting a low-sugar diet and increasing physical activity in daily activities (Bohari, Nuryani, Abdullah, Amaliah, & Hafid, 2021). In addition, it can also be provided as an alternative to support curative treatment or control of blood sugar levels by consuming insulin tea so that it does not increase the risk of complications. The purpose of this study is to determine the effectiveness of *Insulin Tea* against the rate of hyperglycemia in women in climacterium age.

RESEARCH METHOD

A quantitative study was employed through a case control approach with unpaired numerical comparative analysis in two groups with one measurement (Khoirunnisa, Basyar, & Hardian, 2019). There are two sample groups from this study, namely the case group and the control group with the same

number. The population of this study is women in the climacterium age (40-65 years) in the work area of the Baturraden 2 Health Center who meet the inclusion criteria for the study. The inclusion criteria comprised women of climacteric age diagnosed with diabetes mellitus, presenting with hyperglycemia, and receiving antidiabetic therapy. Exclusion criteria encompassed women outside the climacteric age range, those with normoglycemia, individuals without a diagnosis of diabetes mellitus, and those not undergoing antidiabetic treatment. The required sample size was determined using Dahlan's formula (2019), yielding 31 participants in the case group and 31 in the control group. Participants were recruited through purposive sampling.

The study was conducted over a three-week period, from November 22 to December 9, 2025. At baseline, participants underwent random blood glucose testing prior to receiving the intervention. The intervention consisted of administering seven sachets of insulin tea, each containing 0.25 grams, to be consumed once daily for seven consecutive days. Following the intervention, random blood glucose levels were reassessed to evaluate post-treatment outcomes (Yanto & Priskila, 2024). Blood glucose measurements were obtained using a glucose, cholesterol, and uric acid meter (Rahmawati, Hasanuddin, Nur, Samudra, & Maiyo, 2024). Data collected from both the treatment and control groups were subsequently analyzed using a statistical data processing application to facilitate comparison across study variables.

This research has gained ethical clearance from the Health Research Ethics Universitas Muhammadiyah Purwokerto, under the number KEPK/UMP/261/XI/2025.

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RESEARCH RESULTS

Table 1. Characteristics of the Participants (N=62)

Variable	Results	
	Treatment Group (n=31)	Control Group (n=31)
Age (mean±SD)(Range)(Year)	(55.32± 5.93) (40-65)	(55.61± 6.78) (40-65)
Age (n/%)		
40 – 48	4/12.90	3/9.68
49 – 55	9/29.03	11/35.48
56 – 60	11/35.48	8/25.81
61 – 65	7/22.59	9/29.03
Climacterium Stage (n/%)		
Pre-menopause	4/12.90	3/9.68
Peri menopause	9/29.03	11/35.48
Menopause	11/35.48	8/25.81
Post-menopause	7/22.59	9/29.03
Duration of DM (Year) (n/%)		
1 - 5	19/61.29	21/67.74
6 – 10	12/38.71	10/32.26
Occupation (n/%)		
Housewife	17/54.84	14/45.16
Self-employed	5/16.13	6/19.36
Unemployed	9/29.03	11/35.48
BMI (n/%)		
Underweight	3/9.68	2/6.45
Normal	6/19.36	8/25.81
Overweight	7/22.59	5/16.13
Obesity	15/48.37	16/51.61

Table 1 summarizes the baseline characteristics of study participants. The mean age in the treatment group was 55.32 years (SD ± 5.93), while in the control group it was 55.61 years (SD ± 6.78). The majority of participants in the treatment group were within the 56–60 year age range (menopausal), accounting for 35.48%, whereas the control group was predominantly in the 49–55 year age range (peri-menopausal), also at 35.48%. The duration of diabetes mellitus between 1–5 years was most common, reported in 61.29% of the treatment group and 67.74% of the control group. In terms of occupation, housewives comprised the largest proportion in both groups, 54.84% in the treatment group and 45.16% in the control group. Obesity was prevalent in 48.37% of the treatment group and 51.61% of the control group.

Table 2. Changes in Blood Glucose Levels Between Pretest and Posttest

RBG	Treatment Group		Control Group	
	(Mean±SD)	p-value	(Median)(Min-Max)	p-value
Pretest (n=31)	343.13 ± 97.29	<0.001	257.00 (174-406)	0.447-0.2235
Posttest (n=31)	256.74 ± 75.24		245.00 (129-494)	

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Table 2 illustrates the changes in blood glucose levels between pretest and posttest measurements. In the treatment group, the mean posttest value showed a significant reduction compared to baseline, with an average decrease of 86.39 mg/dL ($p < 0.001$). This indicates a statistically significant difference in blood glucose levels following seven days of insulin tea administration. In contrast, the control group demonstrated a median pretest value of 257 mg/dL and a median posttest value of 245 mg/dL, with a p -value of 0.44, suggesting no significant change in blood glucose levels.

DISCUSSION

The results showed a decrease in blood sugar in 31 participants in the treatment group with an average decrease of 86.39 mg/dL. The decrease showed a difference in blood sugar levels before and after giving insulin tea therapy to women in climacterium age.

Participants from the study that has been carried out both from the treatment group and the control group are women who are included in the climacterium age classification. Climacterium is a period that starts from the end of the reproductive period to the beginning of the senium which usually occurs in women aged 40-65 years. This condition is a normal transitional period and lasts several years before and after menopause (Widiastuti & Rohani, 2020). The climacterium stages consist of premenopause, perimenopause, menopause and postmenopause. Premenopause is a physiological condition in which women have entered an aging period which usually occurs at the age of 40-49 years which is characterized by a decrease in estrogen hormones for reproduction and sexuality (Susanti & Indrajati, 2022). Perimenopause occurs at the age of 48-55 years, menopause lasts about 4-5 years, usually occurs at the age of 56-60 years and postmenopause itself occurs at the age of 60-65 years (Kusumawardani, Al-Ghifari, Astiti, & Kurniatun, 2020). And further categorization based on general age ranges revealed that the average age of both the treatment and case groups was 55.61 years.

The incidence of diabetes mellitus is also influenced by the educational level attained by respondents. The level of knowledge has a significant effect on the incidence of diabetes mellitus, as information absorption tends to be more optimal among respondents with higher education (Anisa,

2021). However, in this study, the level of knowledge was dominated by respondents with the lowest level, elementary school. In addition, more respondents in this study had suffered from diabetes mellitus for 1–5 years compared to those who had suffered from diabetes for 6–10 years.

Furthermore, the incidence of diabetes mellitus is also affected by occupation and body mass index, as these are considered major risk factors (Muwakhidah, Khanza, Rahmadita, & Athasya, 2023). Individuals with jobs that involve low physical activity tend to experience weight gain and increased BMI, which in turn increases the risk of diabetes mellitus among women of climacteric age.

Women in the climacterium age experience a decrease in the production of the hormones estrogen and progesterone in the female reproductive organs. So that it will cause physiological events in the form of somatic disorders which include joint pain, headaches, sleep disturbances and fatigue. Then vasomotor disorders which include hot flushes and excessive sweating at night. In addition, there are also urogenital disorders which include vaginal atrophy, vaginal dryness and urinary incontinence (Amelia, Laili, & Putri, 2024). And there can also be psychological disorders and increased risk factors for degenerative diseases. The increased risk of degenerative diseases is caused by a decrease in the function of organs both physically and psychologically. So that it has an impact on the body's functional ability and affects a person's quality of life and productivity. These include non-communicable diseases, such as diabetes mellitus, obesity, cardiovascular and heart diseases, osteoporosis, stroke and others (Anggraini & Agustin, 2022).

The problem found in this study is the increase in blood sugar levels or hyperglycemia in women of climacterium age so that it can increase the risk of diabetes mellitus. This is evidenced by the measurement of blood sugar before being given an intervention with the results of blood sugar checks when in the treatment and control groups showed a figure of >180 mg/dL. Hyperglycemia is a condition in which there is an increase in blood sugar levels beyond normal limits. It is said that it is abnormal if blood sugar is measured during fasting, the results show >125 mg/dL and >180 postprandial or 2 hours after eating. In this state there is a decrease in insulin secretion, a decrease in glucose use and an increase

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in glucose production which affects the homeostatic balance of glucose (Rosares & Boy, 2022). Therefore, it is necessary to give additional insulin in order to improve the homeostatic quality of glucose.

Grants *Insulin Tea* In the treatment group, it was given 1 time in 7 days to see if there was a decrease in blood sugar levels. This is in accordance with research (Manan, Aulia, & Basri, 2024) That there is a decrease in blood sugar levels in patients with type 2 diabetes mellitus after being given a decoction of insulin leaves 1 time in 7 days. This administration is carried out in stages to avoid hypoglycemia due to the administration of *Insulin Tea*. Hypoglycemia is a condition in which there is a decrease in blood sugar levels in the body <70 mg/dL or 4.0 mmol/L which is usually characterized by symptoms of hypoglycemia (Dwiyatna, Erianti, & Wisanti, 2022). Hypoglycemia is often suffered by someone taking insulin or sulfonylurea found in diabetes therapy (Syarli, Putri, & Maulina, 2021). This happens because therapy only focuses on increasing blood glucose levels rather than lowering glucose concentrations (Rusdi, 2020).

In this study, the researcher used *Insulin Tea* or insulin tea which is an innovation to make it easier to consume insulin leaves for the community (Fahrurrozi, Octaviana, & Khaerani, 2025). The making of insulin tea starts from washing the harvested insulin leaves, then drying them so that insulin leaf simplicia can be produced which is then mashed using a blender (Naimah, Nazaruddin, & Cicillia, 2021). After the insulin leaves are fine, they can be put in a tea bag with a dose of 0.25 grams so that they can be stored for a long period of time (Anggraini & Suharyanto, 2025).

Participants in the treatment group who also consumed antidiabetic drugs in the form of metformin that had been given insulin tea experienced a decrease in hyperglycemia levels with an average decrease of 86.39 mg/dL and then the p value = <0.001. So that from the treatment group, the results were obtained that there was a difference between before and after additional interventions were given to control hyperglycemia. In the control group that was not given an intervention but took antidiabetic drugs such as metformin, only served as a comparison without additional intervention.

In this case, insulin leaves contain carbohydrate compounds, triterpenoids, proteins, alkaloids, tannins, saponins, flavonoids and steroids that have the

potential to be antibacterial as well as antidiabetic (Putri, Rahardhian, & Ramonah, 2022) plays an important role in controlling hyperglycemia levels (Saputri & Sa'ad, 2023). Hyperglycemia can trigger endothelial dysfunction so that endothelial cells are unable to limit glucose transport (Wijayanti, Hendriati, Hamid, Widodo, & Kuncorojakti, 2023). In addition, there is also an increase in oxidative stress processes related to cell apoptosis. In the incidence of diabetes mellitus, there is an increase in the formation of free radicals and a decrease in antioxidant capacity, thereby decreasing antioxidant capacity which results in oxidative damage to cells. In this case, the content of oxidative compounds in insulin plants can prevent further cell damage due to hyperglycemia (Aditya & Adifa, 2016).

CONCLUSION

There was a difference in results between before and after insulin tea was given for 7 days, so it can be concluded that *insulin tea administration* is effective in controlling hyperglycemia levels.

SUGGESTION

This research is expected to be the foundation in efforts to utilize insulin plants as plants that are beneficial to health and have high marketability. In the future, the resulting product can first be clinical tested again to be registered as a legal product. So that the wider community can take advantage of it themselves or can buy easily.

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