Health Dynamics
eISSN: 3006-5518
Publisher: Knowledge Dynamics
DOI: https://doi.org/10.33846/hd11106

*Original Research*

# The Effect of Coffee Consumption on Blood Sugar Levels in Diabetes Mellitus Patients in the Working Area of West Denpasar Puskesmas II, Denpasar, Bali, Indonesia

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**Article history**
Received: 6 October 2024
Revised: 23 November 2024
Accepted: 24 November 2024
Published Online: 30 November 2024

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**How to cite this article:** Sulistiawati P, Gama IK, Sudiantara K, Ngurah IGKG. The Effect of Coffee Consumption on Blood Sugar Levels in Diabetes Mellitus Patients in the Working Area of West Denpasar Puskesmas II, Denpasar, Bali, Indonesia. Health Dynamics, 2024, 1(11), 433-438. https://doi.org/10.33846/hd11106



**ABSTRACT**

**Background:** Non-communicable diseases (NCDs) are chronic diseases that cannot be transmitted from person to person. The aim of this study was to determine the effect of coffee consumption on blood sugar levels in diabetes mellitus sufferers in the West Denpasar Health Center II Working Area, Denpasar City. **Methods:** This research method uses pre-experimental design using a non-equivalent control-group before-after design. The research subjects were diabetes mellitus sufferers aged 45 years and over. The population in this study was 77 and the total sample for this study was 44 people using the non-probability sampling technique with the purposive sampling method. The data collection instrument uses a glucometer. Coffee is consumed twice/day as much as 200 ml in the morning and evening 5 minutes after eating for 6 days. **Results:** The research results showed that of the 44 respondents, in the treatment group it was found that the average blood sugar level before being given coffee was 183.50 mg/dL, and after being given coffee was 168.50 mg/dL. Meanwhile, in the control group, the average blood sugar level before and after the study was 198.50 mg/dL. The results of univariate analysis used the Wilcoxon test and obtained a p value of 0.000 ($\alpha < (0.05)$). **Conclusion:** The conclusion of this research is that there is an effect of drinking coffee on blood sugar levels in diabetes mellitus sufferers in the West Denpasar Health Center II Working Area, Denpasar City. It is hoped that from the results of this research, drinking coffee can be used as an alternative drink to lower blood sugar levels.

**Keywords:** Drinking coffee; blood sugar levels; diabetes mellitus

## 1. INTRODUCTION

The global prevalence of diabetes mellitus has been increasing, the effects have been seen in Korea as well. The prevalence of diabetes mellitus was approximately 10.7% among Korean adults in 2020, which was the highest rate of prevalence in the past decade. According to the 2020 Causes of Death Statistics in Korea, the cause-specific death rate of diabetes mellitus was 16.5 per 100,000 population, which makes it one of the biggest national health concern.(1)

Diabetes Mellitus (DM) is a chronic condition caused by a lack of insulin production by the pancreas. The characteristics of diabetes mellitus are characterized by blood glucose (blood sugar) levels exceeding normal limits, namely blood sugar levels before eating exceeding or equal to 126 mg/dL and blood sugar levels while exceeding or equal to 126 mg/dL and blood sugar levels while exceeding or equal to 200 mg/dL.(2) According to the Indonesian

Ministry of Health (2020),[3] referring to the causes, diabetes mellitus can be grouped into three types; type 1, type 2 diabetes mellitus and gestational diabetes mellitus.

The World Health Organization (WHO) states that 422 million people worldwide suffer from diabetes, with the majority living in poor and middle-income countries, and 1.5 million people die from diabetes every year.[4] The prevalence of diabetes patients has continued to increase over the last few decades.

According to the results of Riskesdas in 2018, the number of diabetes mellitus cases in Bali Province was ranked 14th out of 34 provinces in Indonesia.[5] In 2013 the prevalence rate in Bali Province was 1.3% and in 2018 it was 1.7%. Based on data from the Bali Provincial Health Service, the number of diabetes mellitus cases in 2018 from Bali Province was 67,172 diabetes mellitus cases. In 2018, Denpasar City had 9,123 sufferers, and 2,312 of them received services according to their objectives. Denpasar City has 11 Community Health Centers located in each sub-district of Denpasar City.[6]

The results of the 2022 Denpasar Community Health Center report showed that there were 3 top diabetes mellitus cases, namely West Denpasar Community Health Center II with the number of diabetes mellitus sufferers, namely 15.14%, South Denpasar I Community Health Center with 14.27% of diabetes mellitus sufferers, and South Denpasar IV Health Center with the number of diabetes mellitus sufferers. namely 13.71% of sufferers. The highest number of patients with diabetes mellitus prevalence in Denpasar City is at West Denpasar Health Center II with 15.14% of sufferers.

Diabetes mellitus causes complications for sufferers, so it is necessary to prevent and control it. The Denpasar City Government has made efforts to prevent and control diabetes mellitus by forming a Diabetes Mellitus Association which was formed on December 21 2010. The association's activities are held twice a month, namely on Saturday in the second week and in the fourth week, which starts at 08.00 WIT. The activities carried out were physical exercise in the form of diabetes mellitus III exercises, then continued with health checks and counseling about diabetes mellitus.[7]

Diabetes mellitus sufferers who take part in community activities must also receive appropriate therapy. WHO has recommended the use of traditional medicine, one of the plants in Indonesia that is used as traditional medicine is coffee beans.[8] Coffee beans contain many components, the components contained in coffee beans include caffeine, kahweol, chlorogenic acid, cafestol, and micronutrients.[9]

Coffee also contains the compound trigoneline, an alkaloid with anti-diabetes mellitus potential which works similarly to chlorogenic acid in inhibiting glucose absorption in the digestive tract, thus contributing to lowering blood glucose levels. Several studies show that increased erythrocyte magnesium levels due to coffee consumption are correlated with increased insulin secretion.[9]

The results of Fahmi's research found that there were 48 diabetes mellitus sufferers in Sungai Pinang village when they were given robusta coffee.[10] After 6 days of drinking 200 ml Robusta coffee twice a day (morning and evening), blood sugar levels decreased. The results of this study are in line with research conducted by Prasetyo and Sutanta, stating that coffee can reduce blood sugar levels in people with type diabetes if they consume 3 cups of black coffee every day for 14 days, with each cup containing 3 spoons of coffee without sugar.[8] The research results of Sulistyoningtyas et al. found that diabetes mellitus sufferers in Karangrejo Village, Kawedanan District, Magetan Regency experienced changes after being given coffee therapy.[11] It has been proven that blood glucose levels decreased both before and after receiving coffee drinking treatment. Sulistyoningtyas et al. stated that providing coffee consumption therapy can reduce blood sugar levels and be an alternative treatment for lowering blood glucose for diabetes mellitus sufferers.[11]

The research results of Ghavami et al. show that there is inverse relationship between coffee consumption and fasting plasma glucose and diastolic blood pressure in elderly people with diabetes mellitus.[12] On the other hand, Coffee consumption is also associated with increased triglycerides and cholesterol. The conclusion was that elderly patients consumed more than 3 cups of coffee per day for 14 days have fasting plasma glucose and diastolic blood pressure lower, while cholesterol and triglycerides are higher.

The results of preclinical research conducted by Yustisiani et al. found that giving coffee to rats with diabetes mellitus could significantly reduce blood glucose levels.[13] Research conducted by Ujung (2018) also stated that brewing robusta coffee had the effect of

lowering blood glucose levels in white mice which was induced by glucose.[14]

Based on the above background, researchers are interested in examining the effect of drinking coffee on blood sugar levels in diabetes mellitus sufferers in the West Denpasar II Health Center Working Area, Denpasar, Bali Indonesia because according to the 2020 Causes of Death Statistics in Korea, the cause-specific death rate of diabetes mellitus was 16.5 per 100,000 population, which makes it one of the biggest national health concerns. The aim of this research is to analyze the effect of drinking coffee on blood sugar levels during pregnancy diabetes mellitus sufferers at Community Health Center II West Denpasar, Denpasar, Bali Indonesia. This study can be used as scientific information in the field of Nursing Community in the development of endocrine science, especially in control blood sugar levels in the community.

## 2. METHODS

### *2.1 Study Design*

This type of research is included in the category of experimental research, using a pre-experimental research design using a non-experimental design equivalent control-group before-after design, namely the treatment group received treatment and control groups received no treatment. Measurement or observations in the treatment group and control group were carried out twice, before the intervention is carried out, then observed again after the intervention is carried out. The sample in this study was divided into 2 groups, namely the treatment group and control group. This research took place in the Working Area of West Denpasar Health Center II, this area was chosen because the number of diabetes mellitus sufferers is the highest in the city Denpasar.

### *2.2 Population*

Population in This research consisted of 77 diabetes mellitus sufferers in the Community Health Center Work Area II West Denpasar, Denpasar, Bali, Indonesia. Inclusion Criteria in This research is: People with diabetes mellitus, Sufferers who like coffee, age from 45 years and above, area of residence in the West Denpasar Health Center II Working Area. The exclusion criteria in this study were: patients who should not consume too much coffee because they are suffering hypertension, heart disease, sleep disorders, stomach ulcers etc, diabetes mellitus sufferers who are not willing to become informants.

### *2.3 Data Collection*

The data collection process carried out in this research includes: Submit research permission to the head of the nursing department, Denpasar Health Polytechnic through the Education department majoring in nursing Denpasar Health Polytechnic, submit a research permit letter from the Denpasar Health Polytechnic nursing section to the Denpasar Health Polytechnic Rector for this purpose study, officially contact the Head of West Denpasar Community Health Center II by writing a letter to request permission to collect research data at the center, collect secondary data regarding the prevalence of diabetes mellitus at Community Health Center II West Denpasar, researchers selected samples that met the inclusion and exclusion criteria, take an informal approach to the sample being investigated with outline the aims and objectives of the research, provide consent forms for participants. They have to sign the form if you agree to be studied. If one the participant refuses to be researched, the researcher will not force him and will respect his rights, In the treatment group given pre-test blood sugar measurement using an Easy glucometer Touch with the Indonesian Ministry of Health AKL distribution code NO: 20101902214 by researchers accompanied by Community Health Center officers which was carried out at West Denpasar II Community Health Center with a sample size of 22 person, providing education about the contents of robusta coffee, provide robusta coffee powder that is in accordance with the dosage which have been measured by researchers, every day coffee is prepared by researchers and consumption is directly supervised by researchers, the research began on the second day after being given education, the coffee was prepared by the researcher himself, coffee is consumed 2 times/day at 200 ml in the morning and evening for 5 minutes after eating after eating for 6 days. The post-test is carried out on the seventh day from the pre-test implemented. In the control group given: Pre-test blood sugar measurement using a glucometer by The researcher was accompanied by Community Health Center officers who carried out at West Denpasar II Community Health Center with a sample size of 22 person, during the research, there was no control group it is permissible to consume robusta coffee, the post-test will be carried out

6 days after the pre-test is carried out, carry out recapitulation and record the data obtained on recapitulation sheet for data processing.

### *2.4 Data Analysis*

The instrument in this study was to measure the effect of drinking coffee without sugar use robusta coffee powder on a scale of 200 ml of coffee and consume it 2 times a day in the morning and evening 5 minutes after eating for 6 day. Meanwhile, the blood sugar level variable is measured using a tool glucometer.

### *2.5 Ethical Approval*

This research has received ethical approval from the Chairperson of the Health Research Ethics Commission of the Denpasar Health Polytechnic with number: DP.04.02 / F.XXXII.25 / 0495 / 2024.

## 3. RESULTS

The variable measured in this study was blood sugar levels in patients with diabetes mellitus in the work area of West Denpasar Health Center II using an Easy Touch glucometer with the Indonesian Ministry of Health AKL distribution code NO: 20101902214 to measure blood sugar levels in the treatment group before and after being given coffee therapy. , measuring blood sugar levels in the control group before and after the study. The following is an explanation of the results of measuring blood sugar levels on research objects as in the table 1.

**Table 1.** Frequency distribution of blood sugar levels before and after in the treatment and control groups in the work area of West Denpasar II Community Health Center

| Group | Blood sugar levels | Before | | After | |
|---|---|---|---|---|---|
| | | N | % | N | % |
| Treatment | 80-140 mg/dL | 3 | 7 | 4 | 9 |
| | 141-200 mg/dL | 13 | 29 | 15 | 34 |
| | >200 mg/dL | 6 | 14 | 3 | 7 |
| Control | 80-140 mg/dL | 3 | 7 | 4 | 9 |
| | 141-200 mg/dL | 10 | 23 | 10 | 23 |
| | >200 mg/dL | 9 | 20 | 8 | 18 |
| | Total | 44 | 100 | 44 | 100 |

Table 1 displays blood sugar levels of 141-200 mg/dL before being given coffee in the treatment group totaling 13 samples (29%) and blood sugar levels of 141-200 mg/dL after being given coffee totaling 15 samples (34%). Meanwhile, in the control group, blood sugar levels were 141-200 mg/dL before and after the study, amounting to 10 samples (23%).

Table 2. shows that the average blood sugar level before being given coffee was 183.50 and the average blood sugar level after being given coffee experienced decreased to 168.50 while the average blood sugar level results before and after research in the control group was 198.50.

Based on the results of the non-parametric Wilcoxon analysis statistical test carried out by researchers on 44 respondents, a p-value of 0.000 was obtained. This shows that there is a significant effect of giving coffee on blood sugar levels in diabetes mellitus sufferers in the Working Area of West Denpasar Health Center II

**Table 2.** Average blood sugar levels in the treatment group before and after being given coffee, and average blood sugar levels in the control group before and after the study

| Group | N | Minimum | Maximum | Mean | SD |
|---|---|---|---|---|---|
| Treatment group | | | | | |
| Pre-test | 22 | 127 | 297 | 183.50 | 39.51 |
| Post-test | 22 | 115 | 260 | 168.50 | 34.89 |
| Control group | | | | | |
| Pre-test | 22 | 130 | 465 | 198.50 | 68.97 |
| Post-test | 22 | 130 | 465 | 198.50 | 68.97 |

**Table 3.** Hypothesis test results on the effect of drinking coffee on blood sugar levels in individuals with diabetes mellitus

| | Wilcoxon test results | |
|---|---|---|
| | **Treatment group** | **Control group** |
| Z | -4.030[a] | -0.626[a] |
| p-value | 0.000 | 0.531 |

# 4. DISCUSSION

This shows that coffee therapy has the effect of lowering blood sugar levels for people with diabetes mellitus because coffee contains compounds in the form of chlorogenic acid, cafestol, kahweol, magnesium and trigoneline which can help regulate lowering blood sugar levels. Magnesium's mechanism of action improves insulin resistance and glycemic control. Chlorogenic acid can slow down the absorption of glucose in digestion and also increase insulin sensitivity.[11] This finding is in line with Fahmi's research which involved 48 research samples.[10] The results of the study showed that the blood sugar level before being given coffee was 254.88. after being given coffee the blood sugar level was 234.58. decrease in blood sugar levels before and after being given coffee 20.3.

Another study conducted by Prasetyo and Sutanta stated that in 32 samples after consuming coffee there was a temporary decrease in blood sugar levels and had an average value of 292.1563 mg/dL.[8] Blood sugar levels before treatment had an average value of 335.125 mg/dL, while blood sugar levels after treatment had an average value of 292.1563 mg/dL. The results of this research show that there is a decrease in blood sugar levels when consuming coffee according to the researchers' criteria, namely coffee without a mixture of sugar, milk and cream.

Many respondents initially felt that they did not have diabetes mellitus, this was because the symptoms of the disease were often not diagnosed in a short period of time because hyperglycemia was often not visible. However, once the blood sugar level is too high and gives rise to serious symptoms, then people are willing to go to health services for examination.[15]

The average blood sugar levels in the control group before and after the study had the same value. This was because the samples still consumed foods high in sugar, did not exercise enough, and did not receive treatment in the form of coffee therapy which can help lower blood sugar levels and slow down glucose absorption.

Another research conducted by Sulistyoningtyas et al. in a study involving 25 respondents, the average value before being given coffee therapy was 314.56 mg/dL and after being given coffee therapy the average was 231.20 mg/dL.[11] Judging from the change in the average blood glucose of diabetes mellitus sufferers before being given coffee drinking therapy until after being given coffee drinking therapy, the blood glucose has decreased. So, it can be concluded that providing coffee drinking therapy has benefits as an alternative treatment for lowering blood glucose in people suffering from diabetes mellitus.

The decrease in blood sugar levels in the treatment group and the increase in blood sugar levels in the control group occurred because the treatment group received coffee drinking therapy, where coffee contains chlorogenic acid which can help regulate blood sugar levels and reduce the risk of diabetes mellitus by inhibiting glucose absorption in the intestine and increases insulin sensitivity.[16,17]

The weakness of this research is that it is difficult to carry out controlling for several confounding variables that affect glucose metabolism, for example diet and exercise patterns, so they can influence the data results study.

# 5. CONCLUSION

Based on the research results, it can be concluded that drinking coffee can reduce blood sugar levels in diabetes mellitus sufferers in the Working Area of West Denpasar Health Center II, Denpasar, Bali, Indonesia. The following is a summary of the research findings, based on the results data analysis and discussion: Average blood sugar levels before being given coffee in the treatment group was 183.50 mg/dL, after being given coffee, it was 168.50 mg/dL. Happen decreased blood sugar levels by 15. Average blood sugar levels before and after the study in the group control was 198.50 mg/dL. There was an effect of drinking coffee on blood sugar levels in the treatment group and control in

the work area of West Denpasar Health Center II, Denpasar, Bali Indonesia with a p value of 0.000 ($\alpha$<0.05).

## Acknowledgment

The author would like to thank the Director of the Health Polytechnic, Ministry of Health, Denpasar, Chair of the Nursing Department, Health Polytechnic, Ministry of Health, Denpasar, Mr. and Mrs. Lecturer at the Nursing Department, Health Polytechnic, Ministry of Health. Health, Denpasar, West Denpasar Health Center II, and all respondents who took part in this research.

## Funding Information

No funds received for this study.

## Conflict of Interest

The authors declare no conflict of interest.

# REFERENCES

1. Yoo H, Park K. Sugar-Sweetened Coffee Intake and Blood Glucose Management in Korean Patients with Diabetes Mellitus. Metabolites. 2022;12(12):1177. http://dx.doi.org/10.3390/metabo12121177
2. Yoo H, Park K. Sugar-Sweetened Coffee Intake and Blood Glucose Management in Korean Patients with Diabetes Mellitus. Metabolites. 2022;12(12):1177. http://dx.doi.org/10.3390/metabo12121177
3. Indonesian Ministry of Health. Infodatin remains productive, prevents and treats Diabetes Mellitus 2020. In Data and Information Center of the Indonesian Ministry of Health. 2020; pp. 1–10.
4. Mouri M, Badireddy M. Hyperglycemia. StatPearls. Treasure Island (FL): StatPearls Publishing; 2023.
5. Helandu DC, Laksono H, Welkriana PW. Gambaran Kadar Glukosa Darah Sebelum dan Sesudah Mengkonsumsi Kopi pada Penderita Diabetes Melitus Tipe 2 di Wilayah Puskesmas Sawah Lebar Kota Bengkulu. Jurnal Fatmawati Laboratory & Medical Science. 2023;3(1):7-17.
6. Nurmayani W, Syamdarniati, Purqoti DNS. Dampak Pendekatan Spritiutal Terhadap Kepatuhan Pencegahan Penyebaran Virus Covid-19. Jurnal ILKES (Jurnal Ilmu Kesehatan). 2020;11(2):296-305. https://doi.org/10.35966/ilkes.v11i2.183
7. Putra IGY, Suardana IW, Nurlela L, Sya'diyah H, Achjar KAH, Januarti LF, Silvanasari IA, Sari NMCC, Putra IKAD, Rachmawati DS, Lestari AS, Mustika IW, Mirayanti NKA, Kertapati Y, Kirana SAC. KEPERAWATAN KELUARGA : Teori & Studi Kasus. Jambi: PT. Sonpedia Publishing Indonesia, 2023.
8. Prasetyo A, Sutanta. Pengaruh konsumsi seduhan bubuk biji kopi terhadap kadar gula darah sewaktu pada penderita diabetes mellitus tipe 2 di puskesmas Piyungan Bantul. Jurnal Kesehatan Madani Medika. 2015;6(1):14– 20. https://doi.org/10.36569/jmm.v6i1.85
9. Anwari RH. Dampak Konsumsi Kopi pada Penurunan Kadar Glukosa Darah Penderita Diabetes Mellitus Tipe 2. Jurnal Penelitian Perawat Profesional. 2021;3(3):531–40. http://dx.doi.org/10.37287/jppp.v3i3.543
10. Fahmi M. Pengaruh pemberian kopi terhadap penurunan kadar gula darah pada penderita dm di desa sungai pinang wilayah kerja puskesmas Tambang tahun 2021/2022. SEHAT : Jurnal Kesehatan Terpadu. 2022;1(1):140–151. Available from http://journal.universitaspahlawan.ac.id/index.php/s-jkt/article/view/14901
11. Sulistyoningtyas S, Dwihestie L. Gambaran KB Pasca Salin pada Masa Pandemi. Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal. 2022;12(1):75-82. Available from: http://journal.stikeskendal.ac.id/index.php/PSKM/article/view/1700
12. Ghavami HS, Khoshtinat M, Sadeghi-Farah S, Kalimani AB, Ferrie S, Faraji H. The relationship of coffee consumption and CVD risk factors in elderly patients with T2DM. BMC Cardiovascular Disorders. 2021;21(1). http://dx.doi.org/10.1186/s12872-021-02058-7
13. Yustisiani A, Andari D, Isbandiyah. The Effect of Giving Coffee on Reducing Blood Glucose Levels in Wistar Strain White Rats for Diabetes Mellitus Type 2. Saintika Medika. 2013;9(1):38-45.
14. Ujung MN. Testing the Effect of Reducing Blood Glucose Levels of Stewed Robusta Coffee on White Rats with Glibenclamide as a Comparison. World Development. 2018;1(1):1–15.
15. Tjahjono H, Danang E. pengaruh terapi kopi terhadap kadar gula darah acak pada pasien diabetes militus tipe 2 di desa Waru Beron RT. 06 RW. 02 Balongbendo Sidoarjo. Jurnal Keperawatan. 2014;3(2). Available from: https://jurnal.stikeswilliambooth.ac.id/index.php/d3kep/article/view/7
16. Munir NW, Asnaniar WOS Pengetahuan tentang Diabetes Self-Management Education dalam Mengontrol Glukosa Darah Pasien Diabetes Melitus Tipe 2. 2020;11:186-190. http://dx.doi.org/10.33846/sf11nk434
17. Rojas-González A, Figueroa-Hernández CY, González-Rios O, Suárez-Quiroz ML, González-Amaro RM, Hernández-Estrada ZJ, et al. Coffee Chlorogenic Acids Incorporation for Bioactivity Enhancement of Foods: A Review. Molecules. 2022;27(11):3400. http://dx.doi.org/10.3390/molecules27113400