



1. The Effect of Health Education on Diet Compliance Among Patients with Diabetes Mellitus in the Sukaraja Public Health Center's Work Area in Sukabumi Regency
2. The Effects of Husband Support, Motivation, and Self-Efficacy on the Examination of Visual Inspection of Acetic Acid (IVA) in Karawang Village, Karawang Health Center, and Sukabumi Regency in Women of Childbearing Age (PUS)
3. The Experience of Nursing Care Patient with ECG Letal in Intensive Care Unit Sekarwangi Hospital
4. The Effectiveness of Consumption of Red Guava Juice Against Increasing Hemoglobin Levels in Pregnant Women
5. Influence of Hypnotherapy to Reduce the Anxiety of School-Age Children in the Preoperative Phase in the Guntur Room of Level II Dustira Cimahi Hospital
6. Academic Stress Affects Smartphone Addiction in Nursing Student
7. The Effectiveness Of The Protective Barrier Of The Skin Against Medical Adhesive Related Skin Injury (Marsi) In Children Treated In Pediatric Intensive Care Units : Systematic Review
8. Stress Level of Nursing Students During Online Learning During the Covid-19 Pandemic
9. The Relationship of Self Care with Disabilities in People with Leprosy in the South Jakarta
10. Effect of Stress Ball on Stress and Anxiety in Hemodialysis Patients
11. What is the Level of Pain in Patients Who Are Inserted Urinary Catheters Using Pure Jelly?
12. Self-Control Technique to Improve Self-Esteem Among Victims of Bullying
13. The Expectations of Baby Moms and Toddlers in An Integrated Health Care (Posyandu) in Penggilingan Village East Jakarta
14. The Effect of Breastfeeding Technique Education on the Breastfeeding Efficacy of Public Mothers at the GSIA Nabire Clinic, Papua
15. Differences in Knowledge of Preconceptional Mothers about Breast Examination (Breacking) as Pre-and-Post Explanation Breast Cancer Prevention
16. The Effectiveness of Biscuit Consumption of Pregnant Women on Increasing The Circumference of The Upper Arm In Pregnant Women with Chronic Energy Deficiency (CED) In The Karawang Kulon Health Center Area
17. Effectiveness of MGSO4 Administration Against Prevention of Eclampsia in Severe Pre-Eclampsia in RSIA Resti Mulya in 2022
18. Differences in the Effectiveness of Giving Dark Chocolate and Ginger to Reducing Menstrual Pain Intensity in SMAN 1 Cikande Students in 2022
19. The Effect of Baby Massage in Healing Cough of The Common Cold in Infants at Zhafira Zarifa Clinic
20. Relationship of Mothers' Characteristic, Attitude, and Self Efficacy Toward Exclusive Breastfeeding Practice in Work Area of Tigaraksa Public Health Centre
21. Technology-Based Interventions in Schizophrenia Patients : A Narrative Review
22. The Effectiveness of Venopheric Infusation on Ferritine Levels in Pregnant Women with Iron Deficiency Anemia in RSPAD Gatot Soebroto
23. Effectiveness Of Beetroot And Spinach Against The Increase In Hemoglobin Levels Of Pregnant Women In The Primary Clinic Kasih Bunda, 2022
24. The Effect of Audiovisual-Based Education Media on Self Management in Type 2 Diabetes Mellitus Patients in the Work Area of UPT Puskesmas Ledeng
25. The Effect of Progressive Muscle Relaxation on Anxiety in Covid-19 Patients in Bandung
26. The Effectiveness of the Combination of Spiritual Emotional Freedom Technique and Slow Deep Breathing in Lowering Blood Pressure Reduction in Hypertensive Patients at UPT Puskesmas Pasundan, Bandung City
27. MUSKAR-T for Improving Mental Health and Cancer-Related Symptoms in Women Diagnosed with Breast Cancer Undergoing Chemotherapy: A Queasy Experimental Design
28. Overview of Emotional Stability in Class Adolescents Based on Nursing Perspectives
29. NICU Room Baby Care at the Sekarwangi Regional General Hospital: Mothers' Satisfaction with Baby Care and Social Support for Mothers with Premature Infants
30. Effectiveness of Consumption of Brown Rice and Potatoes in Reducing Blood Sugar in the Elderly with Type 2 Diabetes Mellitus at Pondok Ranji Health Center

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## Research Article

# Effectiveness of Consumption of Brown Rice and Potatoes in Reducing Blood Sugar in the Elderly with Type 2 Diabetes Mellitus at Pondok Ranji Health Center

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### Abstract

**Aims:** Type 2 diabetes mellitus in the elderly is still the highest disease in Indonesia. Caused by the elderly cannot produce insulin in sufficient quantities or more. Glucose levels above 200 gr%. Brown rice and potatoes are staple food sources with a fairly high amount of carbohydrates and have lower glucose levels than white rice.

**Research Objectives:** To determine the effectiveness of consumption of brown rice and potatoes in reducing blood sugar in the elderly with type 2 diabetes mellitus at Pondok Ranji Public Health Center, South Tangerang City.

**Research Methods:** This study used a quasi-experimental with purposive sampling with a sample of 20 people. The data technique is included in the bivariate analysis using the SPSS program statistical calculations.

**Research Results:** Based on the results of the study the average value of brown rice consumption in the elderly with type 2 diabetes mellitus was 64.45, and the average value of potato consumption in the elderly with type 2 diabetes was 47.21, the results of the statistical test p-value  $0.02 < 0.05$

**Conclusions and Suggestions:** There is a difference between the consumption of brown rice and potatoes in reducing blood sugar levels in the elderly with type 2 diabetes mellitus, where the results obtained on average are that brown rice is more effective in reducing blood sugar levels compared to potatoes.

### Keywords

Elderly, Type 2 Diabetes mellitus, Brown Rice and Potatoes

## INTRODUCTION

According to WHO the elderly (elderly) are a population group aged 60 years or more (1,2). Globally in 2013 the proportion of the population aged over 60 years was 11.7% of the total world population and it is estimated that this number will continue to increase along with the increase in life expectancy (3). WHO

data shows that in 2000 the life expectancy of people in the world was 66 years, in 2012 it rose to 70 years and in 2013 it became 71 years. The proportion of elderly people in Indonesia also increases every year. WHO data in 2009 showed the elderly amounted to 7.49% of the total population, in 2011 it became 7.69% and in 2013 the proportion of elderly people was 8.1% of the total population (4).

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Diabetes Mellitus in the elderly is a disease that often occurs in the elderly caused because the elderly cannot produce insulin in sufficient quantities or the body is unable to use insulin effectively (5). Diabetes Mellitus is one of the metabolic disorders with hyperglycemic characteristics due to insulin abnormalities caused by impaired work and or insulin secretion. Type 2 diabetes constitutes 90% of all categories of diabetes mellitus. The elderly will naturally also face problems, namely deteriorating health conditions. One of the diseases that accompany the elderly is Diabetes Mellitus (6).

The prevalence of DM shows an increase with increasing age of the patient which reaches its peak at the age of 55-64 years and decreases after passing the age rating. This pattern of increase occurred in Riskesdas 2013 and 2018 which indicated that the higher the age, the greater the risk of developing diabetes (7). The increase in prevalence from 2013-2018 occurred in the age group of 45-54 years, 55-64 years, 65-74 years and years > 75 years. (Banten Health Office, 2021) (8). And according to data from the South Tangerang City Health Office in 2021, DM is the second most common disease in the elderly. Thus, DM is still an important health problem for the elderly in the South Tangerang City area.

## RESULTS

### Analisa Univariat

**Table 1 Frequency Distribution of Blood Sugar Levels Before and After Giving Brown Rice and Potatoes at Pondok Ranji Health Center in 2022**

	Pre-test brown rice	Post test brown rice	Respondent's age	JK	Potato pre-test	Potato post test	Respondent's age	JK
Mean	354.50	245.50	63		353.40	298	65	
Median	350.00	257.40	63	1	353.50	300	65	1
Minimal	225	135	60	2	235	200	60	1
Maximal	485	390	67	1	490	395	72	2

Blood sugar levels in diabetics can be treated using pharmacological drugs. In addition, a healthy lifestyle can also affect the decrease in blood sugar levels (9). Diabetics can consume a diet with staple food sources that are low in glucose. Food sources that are low in glucose are brown rice, wheat, potatoes, corn, sweet potatoes and beans. These food sources are also rich in carbohydrates, fiber, and other vitamins (10).

The formulation of the problem in this study is Is there a difference in the effectiveness of brown rice and potatoes in reducing blood sugar in the elderly with type 2 diabetes mellitus at Pondok Ranji Health Center.

## METHODS

This type of research is a certain type or type of research that is chosen to be carried out in order to achieve the research objectives that have been set. The design in this study was to use (true experiment design pretest-posttest with control group). simple experiment. Measurements were made in two groups before treatment 01 and after treatment 02 (11).

Based on table 1, the results obtained before and after consumption of brown rice, the average age is 63 years, with a minimum age of 60 years and the maximum age of respondents is 67 years, and the average gender is male with fewer female respondents than male respondents. In the brown rice pre-test, the average respondent's blood sugar level was 354 g/dl with a median value of 350 g/dl. The minimum score is 225 gr/dl and the maximum score is 485 gr/dl. And in the post test, the average blood sugar level was 245 g/dl with a median value of 257 g/dl and a maximum blood sugar score of 390 g/dl with a minimum score of 135 g/dl. Furthermore, in the group before and after being given potatoes, the average after the respondent was 65 years, a minimum age of 60 and a maximum of 72 years, with the same gender between men and women, in the pre test the average blood sugar level was 353 g. /dl with a median value of 353 gr/dl. The minimum score for blood sugar levels is 235 g/dl and the minimum score is 490 g/dl. Then in the post test, the average blood sugar level was 298 gr/dl with a middle value of 300gr/dl. The minimum score for blood sugar levels is 200 g/dl and the maximum score is 395 g/dl.

**Table 2.**  
**Normality Test of Blood Sugar Levels before and after consuming brown rice and potatoes in 2022 ( N = 10 )**

Saphiro Wilk

Group	Statistics	Sig
Pre-test brown rice	989	0,996
Post test brown rice	930	0,445
Potato pre-test	960	0,781
Potato post test	879	0,127

Source: Primary data, 2022

It is known in table 2 the value of Sig. in the saphiro-wilk column it has a value  $> 0.05$ , namely red rice pre-test of 0.996 and post-test of brown rice of 0.445 then potato pre-test of 0.781 then potato post-test of 0.127 so that it has a conclusion that the data has normal distribution and paired sample testing is carried out Next t-test.

### Bivariate Analysis

**Table 3.**  
**Paired Sample Statistics Blood sugar levels before and after giving brown rice and potatoes to the elderly in 2022**

Treatment	Mean	n	Standard deviation	standard error
Pre-test brown rice	350.80	10	.74.010	23.404
Post test brown rice	254.50	10	.76.065	24.054
Potato pre-test	353.40	10	.85.116	26.916
Potato post test	298.00	10	.75.851	23.986

Source: Primary data, 2022

In table 3, it is known that the mean value of the red rice pre-test is 350.80 and this value is smaller than the red rice post-test which is 245.50, so it indicates that there is a difference.

Furthermore, the mean value of the potato pre test is 35.40 and this value is smaller than the potato post test result, which is 298.00, therefore it indicates that there is a difference as well.

The number of respondents as many as 10 Std Values. Dev on red pre test 74,020 red rice post test 76,065 Std. Dev pre test potato 85.116 post test potato 75.851, Mean error value for pre test brown rice 23,404 post test 24,054 Mean error value for potato pre test 26,916 and post test 23,986.

**Table 4.**  
**Paired Sample Correlations Blood sugar levels in the elderly before and after consumption of brown rice and potatoes in 2022**

Treatment	N	Correlations	Sig.
Pre test and post brown rice	10	802	005
Potato pre test and post test	10	876	001

Source: Primary data, 2022

It is known from table 4 that the correlations value in the pre-test and post-test of red rice is 0.802 with a sig value. of 0.005 so it can be said that there is a relationship between the pre-test of red rice and post-test of brown rice, then the correlation value in the pre-test and post-test of potatoes is 0.876 with a Sig value. 0.001 so that it can be said that there is also a relationship between the potato pre-test and post-test potato variables.

**Table 5.**  
**Paired Sample Test Blood sugar levels in the elderly before and after giving brown rice and potatoes in 2022**

Treatment	Mean	Std. Dev	Lower	Upper	T	Sig. (2.Tailed)
Red rice pre test – red rice post test	-96.300	47.249	62.500	130.100	6.445	0.00
Potato pre test – potato post test	-55.400	41.021	26.055	84.745	4271	0.02

Source: Primary data, 2022

It is known from table 5.4 that the mean in the pre-test and post-test of red rice is -96,300, this value shows the difference between 62,500 and 130,100. while the mean in pre post potato and post test potatoes is -55,400 with the difference between 26,005 and 84,745

Known: the value of Sig. (2-tailed) in brown rice of  $0.00 < 0.05$  with a t count value of  $6.445 < t$  table  $-2.26216$  so it can be said that there is a significant difference so that it means that there is an effectiveness of consuming brown rice in lowering blood sugar levels ( $H_0$  is rejected and  $H_a$  is accepted) so that the first hypothesis is accepted.

It is known: The value of sig (2. Tailed) in potatoes is  $0.02 < 0.05$  with a t count value of  $4271 < t$  table  $-2.26126$  so it can be said that there is a significant difference so that it means that there is an effectiveness of giving potatoes to the elderly with diabetes mellitus at the Pondok Ranji Public Health Center. ( $H_0$  is rejected and  $H_a$  is accepted) so that the second hypothesis is accepted.

## DISCUSSION

### 1. Respondent Characteristics

In this study, it was found that the average respondent taken was the elderly with type 2 diabetes mellitus aged 60-70 years at the Pondok Ranji health center in 2022. The number of respondents was 20 elderly people. The number of respondents was divided into 2, namely each group of 10 people. 1 group was given brown rice as much as 10 people and the other group was given potatoes as much as 10 people. With the following criteria: willing to be a respondent, no other complications, Not taking blood sugar medication, Elderly with type 2 diabetes mellitus.

Diabetes Mellitus is a condition, chronic hyperglycemia accompanied by various metabolic disorders due to hormonal disorders, which causes various chronic complications in the eyes, kidneys, nerves, and blood vessels, accompanied by lesions on the basement membrane under electron microscopy examination.

Diabetes Mellitus is a disease or chronic metabolic disorder with multiple etiologies characterized by high blood sugar levels accompanied by impaired carbohydrate, lipid, and protein metabolism as a result of insulin function insufficiency. Insufficient insulin production by the beta cells of Langerhans of the pancreas gland, or caused by the unresponsiveness of the body's cells to insulin (WHO, 2019).

### 2. Identifying differences in the intensity of decreasing blood sugar levels in the elderly with diabetes mellitus at the Pondok Ranji Public Health Center in 2022

It is known at the value of Sig. the saphiro-wilk column has a value  $> 0.05$ , namely the red rice pre-test of 0.996 and the red rice post-test of 0.445 then the

potato pre-test of 0.781 then the potato post-test of 0.127 so that it can be concluded that the data is normally distributed.

### 3. To identify the difference in the intensity of giving brown rice and potatoes to the elderly with diabetes mellitus at the Ranji Health Center in 2022 for reducing blood sugar levels

It is known that the mean value of the red rice pre-test is 350.80 and this value is smaller than the red rice post-test which is 245.50 then it indicates that there is a difference. Furthermore, the mean value of the potato pre test is 35.40 and this value is smaller than the potato post test result, which is 298.00, therefore it indicates that there is a difference as well.

### 4. Analyzing differences in the effectiveness of giving brown rice and potatoes to the elderly with diabetes mellitus at the Ranji Health Center in 2022 on reducing blood sugar levels

Known: the value of Sig. (2-tailed) in brown rice of  $0.00 < 0.05$  with a t count value of  $6.445 < t \text{ table } -2.26216$  so it can be said that there is a significant difference so that it means that there is an effectiveness of consuming brown rice in lowering blood sugar levels ( $H_0$  is rejected and  $H_a$  accepted) so that it can be concluded that the average difference between the pre-test and post-test results, which means that there is an effect of giving brown rice to the elderly with type 2 diabetes mellitus, then the sig value (2. Tailed) in potatoes is  $0.02 < 0.05$  with a t count value of  $4.271 < t \text{ table } -2.26126$  so it can be said that there is a significant difference so that it means that there is an effectiveness of the potato method in reducing blood sugar levels in the elderly ( $H_0$  is rejected and  $H_a$  is accepted) so that the second hypothesis is accepted (12).

## CONCLUSION

There is a difference in the effectiveness of reducing blood sugar levels before and after consuming brown rice in diabetics.

There is a difference in the effectiveness of reducing blood sugar levels before and after consuming potatoes in diabetics

There is a difference between brown rice and potatoes on changes in blood sugar levels, but compared to potato consumption, brown rice is more effective in reducing blood sugar levels in the elderly with type 2 diabetes at Pondok Ranji Health Center, South Tangerang City.

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