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The Effect of Tengger Tribe's Traditional Aron Rice on Blood Glucose levels 2 Hours Post-Prandial in Healthy Adult Woman

Pengaruh Nasi Aron Khas Suku Tengger terhadap Perubahan Kadar Glukosa Darah 2 Jam Post-Prandial pada Wanita Dewasa Sehat

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ABSTRACT

Background: In 2021, Indonesia recorded 19.5 million cases of diabetes mellitus. Women exhibit a 1.02 fold higher risk of developing diabetes mellitus when accounting for physical factors. Dietary management using the special concept (schedule, amount, and type) is an appropriate choice for diabetes mellitus patients to control blood glucose levels. Aron rice, a processed white corn variety typical of the Tengger tribe, is high in fiber and may help control blood glucose levels.

Objectives: This objective of this research is to examine the effect of Tengger tribe's special Aron rice on 2-hour post-prandial blood glucose levels in healthy adult women.

Methods: This experimental method involved interventions with control food (pure sugar) and test food (Aron rice). The research design used a pre-test post-test one-group design. The sample consisted of 16 participants selected through purposive sampling based on inclusion criteria. The study was carried out from July to September 2024. The instruments in this study utilized the observation method of 2-hour post-prandial blood glucose measurements following the administration of control and test foods. The data were analyzed using a paired t-test to examine the effect of Aron rice on changes in 2-hour post-prandial blood glucose levels.

Results: The study findings indicate an average blood glucose level before the control food was 87.75 mg/dL, while before the test food, it was 85.88 mg/dL, with a p-value of 0.107>0.05, indicating no significant difference in fasting blood glucose levels at minute 0. After the control food, the average blood glucose level was 115.63 mg/dL, while after the test food, it was 90.00 mg/dL. There was a mean difference of 25.63 mg/dL with a p-value of 0.000<0.05, indicating a significant difference in fasting blood glucose levels in 2 hours.

Conclusion: Tengger tribe's special Aron rice affects changes on 2-hour post-prandial blood glucose levels in healthy adult women, resulting in lower levels compared to pure sugar. Aron rice can be an alternative staple food for diabetes mellitus patients as an effort to improve blood glucose control in the body.

Keyword: Aron rice, Food nutrition improvement, Post-prandial blood glucose, Tengger tribe's

ABSTRAK

Latar Belakang: *Tahun 2021, Indonesia mencapai angka 19.5 juta penderita diabetes mellitus. Perempuan memiliki resiko 1.02 kali lebih besar mengalami diabetes mellitus dilihat dari segi pola hidup. Pengaturan pola makan dengan konsep khusus (Jadwal, Jumlah, dan Jenis) menjadi pilihan yang tepat bagi*

penderita diabetes melitus untuk mengontrol glukosa darah dalam tubuh. Nasi Aron merupakan olahan varietas jagung putih khas suku tengger dengan kandungan serat yang tinggi sehingga mungkin dapat untuk mengontrol kadar glukosa darah dalam tubuh

Tujuan: *Tujuan dari penelitian ini adalah untuk mengetahui pengaruh nasi aron khas suku tengger terhadap perubahan kadar glukosa darah 2 jam post-prandial pada wanita dewasa yang sehat.*

Metode: *Penelitian ini merupakan penelitian eksperimental dengan intervensi berupa pemberian makanan kontrol berupa gula murni dan makanan uji berupa nasi aron. Rancangan penelitian ini menggunakan pre-test post-test one group design. Sampel penelitian sebanyak 16 orang dengan metode purposive sampling dimana penentuan sampel menggunakan kriteria inklusi yang telah ditetapkan. Penelitian ini dilaksanakan pada periode bulan Juli hingga September2024. Instrumen dalam penelitian ini menggunakan metode observasi hasil pengecekan glukosa darah 2 jam post-prandial setelah pemberian makanan kontrol dan uji. Data dianalisis dengan uji paired t-test untuk mengetahui pengaruh nasi aron terhadap perubahan glukosa darah 2 jam post-prandial.*

Hasil: *Temuan penelitian menunjukan rata rata sebelum diberikan makanan kontrol sebesar 87.75 mg/dL sedangkan sebelum diberikan makanan uji sebesar 85,88 mg/dL sebelum diberikan makanan uji dengan p-value sebesar 0.107>0.05 sehingga tidak ada perbedaan bermakna terhadap nilai glukosa darah puasa responden pada menit ke-0. Selanjutnya nilai rata rata setelah diberikan makanan kontrol sebesar 115.63 mg/dL sedangkan setelah diberikan makanan uji sebesar 90.00 mg/dL. Ada perbedaan rata-rata sebesar 25.63 mg/dL dengan p-value sebesar 0.000<0.05 sehingga terdapat perbedaan bermakna terhadap nilai glukosa darah puasa pada waktu 2 jam.*

Kesimpulan: *Nasi aron khas suku tengger mempengaruhi perubahan kadar glukosa darah 2 jam post-prandial pada wanita dewasa yang sehat lebih rendah daripada gula murni. Nasi aron dapat menjadi alternatif makanan pokok bagi penderita diabetes melitus sebagai upaya peningkatan kontrol glukosa darah dalam tubuh.*

Kata kunci: *Glukosa darah post-prandial, Nasi aron, Peningkatan nutrisi pangan, Suku tengger*

INTRODUCTION

Diabetes mellitus is a metabolic syndrome arising from defects in insulin secretion, diminished insulin activity, or both, and defined by persistent blood glucose concentrations above normal limits (hyperglycemia) (Perkeni, 2019). In 2021, Indonesia recorded 19.5 million cases of diabetes mellitus and is expected to increase to 21.3 million by 2030 (American Diabetes Association, 2021). The management of diabetes mellitus begins with adopting a healthy lifestyle, including nutritional therapy and dietary regulation (Perkeni, 2021). The diet of diabetes patients must consider the dietary schedule, portion size, and food categories ingested to avoid sugary foods and maintain controlled blood glucose levels (Susanti and Nobel Bistara, 2018).

Among numerous risk factors for diabetes mellitus, gender is frequently implicated. The prevalence of diabetes mellitus is higher in women than men. Adult females demonstrate significantly greater diabetes risk (Tiurma and Syahrizal, 2021). Physiologically, women exhibit higher propensity for increased body mass index (Komariah and Rahayu, 2020), correlating with comparatively lower physical activity levels versus males (Rudi and Kruweh, 2019).

The consumption of macronutrients, particularly carbohydrates containing sugar, is necessary for the body as a primary energy source to support daily activities (Rejeki *et al*., 2024). However, excessive carbohydrate intake can trigger an increase in blood glucose levels. To control the levels, carbohydrate-containing foods can be categorized using the concepts of glycemic index and glycemic load, which manage blood glucose responses (Permatasari, Sudargo and Purnomo, 2015). The insulin response will impact blood glucose control based on the type and amount of food consumed.

Indonesia, as an agrarian country, has potential local carbohydrate sources. One such local food is corn, which has been developed and diversified into corn rice, a fiber-rich staple food suitable for diabetes patients as it reduces the risk of elevated blood glucose levels (Inayah, Metty and Aprilia, 2021). High-fiber corn is widely distributed among communities in East Java, where it serves as a primary carbohydrate source. The Tengger tribe in the Bromo mountain area has a staple food

called Aron rice, made from processed white corn and which undergoes a processing period of over a month (Minantyo *et al*., 2022). From a nutritional perspective, Aron rice made from white corn contains lower carbohydrate content (19.04 grams) compared to white rice, the staple food of most Indonesians. Furthermore, Aron rice offers functional food advantages with its high fiber content of 9.7 grams (Maligan, Pratiwi and Widyaningsih, 2020). High fiber foods can control blood glucose levels and serve as an alternative food ingredient with a low glycemic index and glycemic load (Mulyasari and Maryanto, 2020). However, there remains a paucity of relevant research examining the potential benefits or correlation between consumption of the Tengger tribe's traditional Aron rice and changes in blood glucose levels. This objective of this research is to examine the effect of Tengger tribe's special Aron rice on 2-hour post- prandial blood glucose levels in healthy adult women.

METHODS

This research is classified as an experimental study involving the provision of a food intervention in the form of Aron rice. The research design used is a pre-test post-test one-group design. The research was conducted at the Undergraduate Nutrition Science Program, State University of Surabaya, and took place from July to September 2024. The study sample consisted of 16 healthy adult women participants, selected through purposive sampling**,** where the sample determination was based on predefined inclusion criteria. The sample size was determined using Federer's formula (Rahayu and Pontang, 2018), consistent with experimental research theory which recommends 10-20 subjects per group for basic experimental studies (Sugiono, 2016). The selection of participants according to the inclusion criteria was summarized in a respondent screening activity, which involved measuring several parameters such as body mass index (BMI)**,** blood pressure, and fasting blood glucose, all of which had to fall within the normal category. If respondents had a BMI in the overweight, underweight, or obese categories, it could lead to several risk factors for various diseases. For example, biochemical measurements might show elevated blood glucose levels, which could bias the data (Salim, Wihandani and Dewi, 2021). The American Diabetes Association (2018) states that two out of three people with diabetes have high blood pressure. Hyperglycemia is often accompanied by metabolic syndrome, one of which is high blood pressure. Additionally, respondents were not individuals with type 1 or type 2 diabetes mellitus, glucose metabolism disorders, undergoing specific treatments or interventions, smokers, or those with allergies to Aron rice.

The intervention involved two treatments: the provision of a control food (pure sugar) and a test food (Aron rice)**,** both containing 50 grams of carbohydrates. Pure sugar, derived from sulfite-processed sugarcane, consists exclusively of simple carbohydrates that are readily absorbed without requiring metabolic breakdown (Ferretti and Mariani, 2017). Its selection as the control food was based on nutritional composition. 1 gram of pure sugar contains 1 gram of carbohydrates without other nutrients, enabling precise measurement of blood glucose elevation in this study. Before the intervention, respondents were required to fast for 8-10 hours**,** after which their fasting blood glucose levels were used as baseline data. The treatments were then administered by providing the control food and test food at different times. After consuming the control and test foods, blood glucose levels were measured two hours post-prandial. The measurement of blood glucose levels in this study used the finger-prick capillary blood sample method**.** The tools used included an Easy Touch GCU glucometer**,** glucose test strips**,** lancet needles**,** and alcohol swabs.

Descriptive analysis was used to analyze the characteristics of the respondents and to understand the distribution of the respondent data. Meanwhile, statistical analysis to determine the effect of Aron rice on blood glucose levels at two hours post-prandial was conducted using IBM SPSS 26 software with the paired T-test method. This research has obtained ethical approval from the Health Research Ethics Commission of the Faculty of Dentistry, Airlangga University, with certificate number 0646/HRECC.FODM/VII/2024.

RESULTS AND DISCUSSION

Respondent Characteristics

The intervention activities involving the provision of control and test foods began with respondent screening, which included recording characteristics and measuring three parameters: body mass index (BMI)**,** blood pressure**,** and fasting blood glucose. All respondents in this study were healthy adult women. In terms of age, the majority were 20 and 21 years old, with the same frequency of 31.25%. A small portion of respondents were 19 years old, with a frequency of 25%, and 22 years old, with a frequency of 12.5%. In accordance with the inclusion criteria, all respondents had BMI values within the normal category (18.5-25) (Kemenkes, 2014). All respondents' blood pressure parameters were within the normal category, <120/80 mmHg (American Diabetes Association, 2018). Additionally, the respondents' fasting blood glucose levels were also within the normal range of 70-99 mg/dL (Perkeni, 2019). This is supported by

Tsyaniyah's (2024) research, which found a significant correlation of obesity and blood glucose levels in working-age populations.

This experimental research utilized human subjects to generate the target data. Participant screening was rigorously conducted to standardize measurements of post-prandial blood glucose levels following consumption of either pure sugar or Aron rice. The screening protocol included assessments of BMI, blood pressure, and fasting blood glucose, parameters directly correlated with endogenous glucose regulation. Normal baseline measurements ensured the reliability of subsequent post-prandial glucose evaluations.

The screening process also facilitated the selection of healthy adult female participants, resulting in a study participant with homogeneous and tightly controlled characteristics. The resulting screening data showed low variance, enabling clear differentiation of outcomes between control (pure sugar) and test (Aron rice) food interventions, thus ensuring accurate statistical conclusions.

2-Hour Post-Prandial Blood Glucose Response

The blood glucose response refers to the changes in blood glucose levels after consuming carbohydrate-containing foods. The intervention involved two treatments: the provision of a control food (pure sugar) and a test food (Aron rice) to the same respondents. This study showed that the blood glucose response profiles before and two hours after consuming the control food and test food had different average results.

Table 1. 2 Hours Post-Prandial Blood Glucose Response

	Control food (Pure sugar) (mg/dL)			Test food (Aron rice) (mg/dL)			p-value
	mean	**min**	**max**	**mean**	**min**	**max**	
Before consuming	87.75	82	92	85.88	80	92	0.107
2 hours after consuming	115.63	99	131	90.00	80	109	0.000

Based on the table above, the results of the difference test before and after the intervention of control food and test food were obtained using the paired T-test. The average blood glucose level before the control food was 87.75 mg/dL**,** while before the test food, it was 85.88 mg/dL**,** with a p-value of 0.107>0.05**,** indicating no significant difference in fasting blood glucose levels at minute 0. Furthermore, the average blood glucose level after the control food was 115.63 mg/dL, while after the test food it was 90.00 mg/dL. There was a mean difference of 25.63 mg/dL with a p-value of 0.000<0.05, indicating a significant difference in fasting blood glucose levels at minute 120.

Blood glucose levels in the morning increase after eating but remain at their lowest level (Novrian and Hajar, 2020). An individual's blood glucose levels vary daily and rise after consuming food or drinks containing carbohydrates. This occurs due to a reaction by the body's cells (Triana and Salim, 2017). When an individual consumes carbohydrate-containing food, the body reacts by sending a signal to the pancreas, which acts like a key. When carbohydrates enter the body, the pancreas opens the body's cells, allowing glucose from the food to enter the cells, providing energy through the glycolysis process. If blood glucose levels in the cells increase or become uncontrolled, the absorbed glucose will be converted into glycogen and stored in the liver (Guyton and Hall, 2017).

Blood glucose levels in the body will return to normal limits within two hours after food consumption. The decrease in blood glucose occurs gradually due to the action of glucagon produced by β-pancreatic cells. Glucagon slows the entry of glucose into tissue cells. Additionally, glucagon plays a role in glycogenolysis to convert glikogen to glucose at the stored in the liver and in gluconeogenesis to increase the amount of fatty acids and amino acids, which are derivatives of fats and proteins, into glucose (Guyton and Hall, 2017).

Blood glucose levels two hours after eating will exceed normal limits if the individual consumes food or drinks containing only simple sugars. This is because consuming simple sugars can quickly increase blood glucose levels and insulin concentration (Kosasih, Sutadarma and Dewi, 2020). The control food in this study used pure sugar, which consists solely of simple carbohydrates without other nutrients and is readily absorbed and digested without undergoing breakdown (Ferretti and Mariani, 2017). As a result, blood glucose levels two hours post-prandial still exceeded normal limits. This finding is supported by Situmorang's (2023) study comparing the increase in blood glucose levels before and after the provision of pure sugar, palm sugar, and honey in student respondents, which found that the highest increase in blood glucose levels was caused by pure sugar compared to other types of sugar.

Aron rice is made from white corn, a variety commonly found on the slopes of Mount Bromo, serving as a carbohydrate-rich food substitute in its kernels. Corn has the advantage of being high in functional fiber. The fiber content in white corn is 10.9 grams. Additionally, the fat content in white

corn is higher than that of rice and sorghum, at 4.3 grams (Winarti *et al.*, 2023). High fat and fiber in the foods can control and lower blood glucose levels due to their ability to slow down gastric emptying (Inayah, Metty and Aprilia, 2021). Besides promoting satiety, slower gastric emptying also affects the rate of nutrient absorption, particularly glucose absorption, preventing blood glucose levels from spiking too high and allowing them to return to normal levels quickly. Therefore, carbohydrate-containing foods accompanied by other nutrients do not cause blood glucose spikes and tend to return to normal levels within two hours after consumption.

After consuming Aron rice, all respondents showed a less sharp peak compared to the results after consuming pure sugar. From a physical standpoint, women have a higher risk of hyperglycemia or becoming diabetic compared to men (Lathifah, 2017). Women also tend to experience a more rapid increase in body mass index, which is supported by monthly syndromes (premenstrual syndromes) (Samapati, Putri and Devi, 2023). However, the average 2-hour post-prandial blood glucose levels were still within the normal range. Therefore, Aron rice can be used as an alternative staple food for diabetes mellitus patients. Strategic selection of appropriate staple food may enhance long-term blood glucose control.

The research population consisted predominantly of adult females, with minimal male representation. Consequently, this study focused exclusively on adult women and could not compare postprandial glucose responses to Aron rice consumption between healthy males and females. Nevertheless, the findings remain methodologically robust due to stringent participant selection with controlled parameters. The results demonstrate Aron rice's potential as a therapeutic dietary option for both hyperglycemic-risk women and diagnosed diabetes mellitus patients to improve blood glucose control.

CONCLUSION

The finding of this research using the paired T-test showed a p-value of 0.000<0.05, indicating that Tengger tribe's special Aron rice has a significant effect on 2-hour post-prandial blood glucose levels in healthy adult women, resulting in lower levels compared to pure sugar. Aron rice can be an alternative staple food for diabetes mellitus patients as an effort to improve blood glucose control in the body.

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Conflict of Interest and Funding Disclosure

None.

Author Contributions

IKB: methodology, investigation, data curation, writing-original draft, writing-review, and editing. NRM: conceptualization, visualization, resource, methodology, supervision, and writing-review.

REFERENCES

American Diabetes Association (2018) 'Classification and diagnosis of diabetes: Standards of medical care in Diabetes 2018', *Diabetes Care*, 41(January), pp. S13–S27. ttps://doi.org/10.2337/dc18-S002.

American Diabetes Association (2021) 'Standards of Medical Care in Diabetes-2021', *Diabetes Care*, 37, pp. 14–80. https://doi.org/10.2337/dc14-S014.

Ferretti, F. and Mariani, M. (2017) 'Simple vs. complex carbohydrate dietary patterns and the global overweight and obesity pandemic', *International Journal of Environmental Research and Public Health*, 14(10). https://doi.org/10.3390/ijerph14101174.

Guyton, A.C. and Hall, J.E. (2017) *Buku Ajar Fisiologi Kedokteran Edisi Ke 12*, *Saunders Elsevier*.

Inayah, I., Metty, M. and Aprilia, Y. (2021) 'Indeks Glikemik dan Beban Glikemik Nasi Jagung Instan dengan Penambahan Tepung Tempe Sebagai Alternatif Makanan Pokok Pasien Diabetes Mellitus', *Ilmu Gizi Indonesia*, 4(2), p. 179. https://doi.org/10.35842/ilgi.v4i2.238.

Kemenkes, R. (2014) 'Permenkes No. 41 Tahun 2014 Tentang Pedoman Gizi Seimbang', 58(12), pp. 7250–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/25246403%0Ahttp.

Komariah, K. and Rahayu, S. (2020) 'Hubungan Usia, Jenis Kelamin Dan Indeks Massa Tubuh Dengan Kadar Gula Darah Puasa Pada Pasien Diabetes Melitus Tipe 2 Di Klinik Pratama Rawat Jalan Proklamasi, Depok, Jawa Barat', *Jurnal Kesehatan Kusuma Husada*, (Dm), pp. 41–50. https://doi.org/10.34035/jk.v11i1.412.

Kosasih, A.M., Sutadarma, I.W.G. and Dewi, N.N.A. (2020) 'Hubungan asupan gula sederhana terhadap kadar glukosa darah pada pasien diabetes mellitus tipe II', *Intisari Sains Medis*, 11(3), pp. 973–977. https://doi.org/10.15562/ism.v11i3.676.

Lathifah, N.L. (2017) 'Hubungan durasi penyakit dan kadar gula darah dengan keluhan subyektif penderita diabetes melitus', *Jurnal Berkala Epidemiologi*, 5(2), p. 218. https://doi.org/10.20473/jbe.v5i2.2017.231-239.

Maligan, J.M., Pratiwi, D.D. and Widyaningsih, T.D. (2020) 'Studi Preferensi Konsumen terhadap Nasi Putih dan Nasi Jagung Putih pada Pekerja Wanita di Kantor Pemerintah Kota Malang', *Indonesian Journal of Human Nutrition*, 7(2), pp. 139–152.

Minantyo, H. *et al.* (2022) *Resep Kreasi Olahan Pangan Berbahan Dasar Pangan Lokal di Bromo*. DeePublish. Available at: https://dspace.uc.ac.id/handle/123456789/6574.

Mulyasari, I. and Maryanto, S. (2020) 'Blood Glucose Profile in Healthy Adults With Nasi Jagung Consumption Habit', *AIP Conference Proceedings*, 2231(April). https://doi.org/10.1063/5.0002647.

Novrian, F., dan Hajar, S. (2020) 'Perbandingan Peningkatan Kadar Glukosa Darah Puasa Sebelum dan Sesudah Pemberian Madu', *Jurnal Ilmiah Simantek*, 4(4), pp. 146–152.

Perkeni (2019) *Pengelolaan Dan Pencegahan Diabetes MelituS Tipe 2 Dewasa di Indonesia*, *PB Perkeni*.

Perkeni (2021) *Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia 2021*, *PB Perkeni*. Available at: www.ginasthma.org.

Permatasari, S.M., Sudargo, T. and Purnomo, L.B. (2015) 'Estimasi Asupan Indeks Glikemik dan Beban Glikemik Dengan Kontrol Gula Darah Pasien Diabetes Melitus Tipe 2', *Jurnal Gizi Klinik Indonesia*, 12(2), p. 45. https://doi.org/10.22146/ijcn.23116.

Rahayu, L. and Pontang, G.S. (2018) 'Glycemic Index Analysis on Nugget Made From Chicken Mixed White Oyster Mushrooms (Pleurotus Ostreatus)', *Jurnal Gizi dan Kesehatan*, 10(24), pp. 142–149.

Rejeki, S. *et al.* (2024) 'Analisis Asupan Energi, Karbohidrat, dan Serat dari Pangan Pokok di Wilayah Non Pertanian di Kota Baubau 2022', *Jurnal Gizi Ilmiah*, 11, pp. 35–41.

Rudi, A. and Kruweh, H.N. (2019) 'Faktor Risiko yang Mempengaruhi Kadar Gula Darah Puasa Pada Pengguna Layanan Laboratorium', *Wawasan Kesehatan*, 3(2), pp. 33–39.

Salim, B.R.K., Wihandani, D.M. and Dewi, N.N.A. (2021) 'Obesitas sebagai faktor risiko terjadinya peningkatan kadar trigliserida dalam darah: tinjauan pustaka', *Intisari Sains Medis*, 12(2), pp. 519–523. https://doi.org/10.15562/ism.v12i2.1031.

Samapati, R.U.R., Putri, R.M. and Devi, H.M. (2023) 'Perbedaan Kadar Gula Darah Berdasarkan Jenis Kelamin dan Status Gizi (IMT) Lansia Penderita Diabetes Melitus Tipe 2', *Jurnal Akademika Baiturrahim Jambi*, 12(2), p. 417. https://doi.org/10.36565/jab.v12i2.699.

Situmorang, P.R., Zalukhu, B. and Napitupulu, D.S. (2023) 'Perbandingan Peningkatan Kadar Glukosa darah Sebelum dan Setelah pemberian Gula Putih, Gula Aren, dan Madu Pada Mahasiswa TLM di STiKes Santa Elisabeth Medan Tahun 2023', *Journal of Indonesian Medical Laboratory and Science (JoIMedLabS)*, 4(2), pp. 136–147. https://doi.org/10.53699/joimedlabs.v4i2.154.

Sugiono (2016) *Metode Penelitian Kuantitatif, Kualitatif dan R&D*.

Susanti and Nobel Bistara, D. (2018) 'Hubungan Pola Makan Dengan Kadar Gula Darah Pada Penderita Diabetes Mellitus (The Relationship between Diet and Blood Sugar Levels in Patients with Diabetes) Mellitus.', *Jurnal Kesehatan Vokasional*, 3(1), pp. 29–34. Available at: http://journal.ugm.ac.id/jkesvo.

Tiurma, R.J. and Syahrizal (2021) 'Obesitas Sentral dengan Kejadian Hiperglikemia pada Pegawai Satuan Kerja Perangkat Daerah', *Higeia Journal of Public Health Research and Development*, 5(3), pp. 227–238.

Triana, L. and Salim, M. (2017) 'Perbedaan Kadar Glukosa Darah 2 Jam Post Prandial', *Jurnal Laboratorium Khatulistiwa*, 1(1), p. 51. https://doi.org/10.30602/jlk.v1i1.97.

Tsyaniyah, A.A., Aisyah, I.S. and Husnul, N. (2024) 'Status obesitas dan kadar gula dara pada usia produktif', *Nutrition Scientific Journal*, 3(1), pp. 44–51. https://doi.org/10.37058/nsj.v3i1.11168.

Winarti, C. *et al.* (2023) 'Nutrient Composition of Indonesian Specialty Cereals: Rice, Corn, and Sorghum as Alternatives to Combat Malnutrition', *Preventive Nutrition and Food Science*, 28(4), pp. 471–482. https://doi.org/10.3746/pnf.2023.28.4.471.