The Effectiveness of Giving Dried Belimbing Wuluh/ *Averhoa blimbi L*. (Sunti Aceh) Extract Dose 25 mg/gr of Body Weight on Reducing Blood Sugar Levels in Diabetic Rats

Enda Silvia Putri[1], Khairunnas Khairunnas[2], Afriani Maifizar[3], Sufyan Anwar[4], Marniati Marniati[5]
[1,2]Departement of Nutrition Universitas Teuku Umar
[3]Departement of Sosiology Universitas Teuku Umar
Email corresponding author: endasilviaputri@utu.ac.id
Submitted:19/7/2021 **Conferrence:** 17/10/2021 **Accepted:** 14/2/2022 **Published online**: 8/3/2022

Abstract: Introduction Type 2 Diabetes Mellitus is still a problem in West Aceh with the prevalence rate always being the second highest of the ten highest non-communicable diseases in the Public Health Center. Unhealthy eating patterns and the lack of local food-based herbal medicines that can control blood sugar levels are one of the risk factors for the high prevalence rate. Based on this, researchers are interested in researching local sunti aceh food as an anti-diabetic. The aim of the study was to analyze the effectiveness of giving sunti aceh extract at a dose of 250 mg/BB g on reducing blood glucose levels in diabetic rats. Experimental research method with pre and post test randomized controlled group design, the experimental animals were 15 rats which were divided into 3 groups, namely group 1 aquadest, group 2 metformin at a dose of 500mg/gr of body weight, group 3 sunti aceh extract (SAE) at a dose of 250mg/gr of bodyweight. All groups were induced with alloxan first until blood sugar levels 200mg/dl. After four weeks of treatment, blood sugar levels were measured at a time, then seen a decrease in blood sugar levels and analyzed data on the average comparison of blood sugar levels using the t-dependent test. The results showed that group 1 did not experience a significant decrease in blood sugar levels between pre and post test at p value> 0.05, while groups 2 and 3 experienced a significant decrease in blood sugar levels between pre and post test at p <0.05. In conclusion, groups 2 and 3 both have a better level of effectiveness than aquadest, but group 2 is more effective than group 3 in terms of decreasing blood sugar levels.

Keywords : Sunti Aceh, Extract, Diabetes

Introduction

Diabetes Mellitus Type 2 (DM Type 2) is still a problem in West Aceh, based on prevalence data obtained at several health centers in Aceh Barat, the average diabetes prevalence rate is the second highest every year out of the top 10 lists of non-communicable diseases. The increase in cases based on research by previous researchers and supported by other research studies shows that a person's risk factor for developing diabetes is the lack of consuming foods containing nutrients that can control blood sugar levels. These foods, such as foods that contain lots of fiber and micro-substances such as flavonoids, are able to act as inhibitors of the alpha-glucosidase enzyme and are also able to function to delay the absorption of carbohydrates so that blood glucose levels will decrease (1–9).

These micronutrients can be obtained from local food such as sunti aceh, therefore it is very important to introduce the benefits of local food to prevention efforts by processing it into food and herbal medicines that can be consumed by diabetes risk groups. Interventions in the

risk group from changing diet by consuming a lot of local food in the form of food products and herbal medicines are expected to be able to reduce the number of diabetes cases in West Aceh(10,11).

Researchers focused on local sunti aceh food products, this is because these foods are often found in Aceh which so far have only been used as ordinary kitchen ingredients. Sunti Aceh contains sufficient flavonoids to control blood sugar levels, so researchers are interested in examining the effectiveness of Sunti Aceh in reducing blood sugar levels by starting with testing on experimental animals, namely diabetic rats.

Method

The research method is experimental in the laboratory with pre and post test randomized controlled group design. The research object was 15 rats that had been injected with alloxan so that blood sugar levels (kgd) reached 200mg/dl (pretest). The 15 rats were grouped into 3 groups with each treatment (posttest), namely the negative control group was group 1 aquadest. Positive control group, namely group 2 metformin at a dose of 500 mg/gr of bodyweight. Intervention group group 3 sunti aceh extract (SAE) 250mg/gr of body weight. All groups after being given treatment for four weeks were measured blood sugar levels and seen a decrease in blood sugar levels.

Primary data are the results of measuring blood sugar levels of rats that have been induced by alloxan before and after negative, positive control, and SAE administration. The data were then processed using SPSS for Windows Realease 20. The data were analyzed using the comparative hypothesis test of two numerical variables, namely the dependent t test.

Result

The results of the study based on the results of the dependent t test can be read in Table 1.

Table 1. Results of data analysis with dependent t test

Variabel	Mean	SD	P Value	N
Group 1 (Aquadest)				
Pre Test	390.40	97.575	0.226	5
Post Test	287.80	65.396		
Group 2 (Metformin 500mg/gr of bodyweight)				
Pre Test	352.00	26.505	0.000	5
Post Test	146.00	20.489		
Group 3 (SAE 250 mg/gr of bodyweight)				
Pre Test	324.00	33.196	0.003	5
Post Test	130.20	37.117		

Based on the results of the t-dependent test in Table 1, it can be seen that the comparison of the average pre and post test blood sugar values in group 1 is not significant because it has a p value> 0.05, it can be concluded that the decrease in blood sugar levels in group 1 is not so

significant, this is inversely proportional to groups 2 and 3 who get a significant comparison of pre and post test blood sugar levels with a p value <0.05, meaning there is a significant decrease in blood sugar levels after treatment with metformin and SAE.

Discussion

Based on the results of the study, it was found that the average value of rat blood glucose levels after alloxan induced was 200 mg/dl. In group one the average value of blood glucose levels at the time of the pre-test was 390.40 mg/dl and 199.60 mg/dl post-test. Group two the average value of blood glucose levels at the time of the pre-test was 352.00 mg/dl and the post-test was 146.00 mg/dl. Group three the average value of blood glucose levels at the time of pre-test was 324.00 mg/dl and post-test was 130.20 mg/dl. There was a decrease in the value of blood glucose levels in each group based on the results of the paired group bivariate or dependent t test. however, those who had a significant decrease in blood glucose levels were in groups two and three with p<0.05.

Based on the p value groups 2 and 3 are more effective than group 1, but group 2 is more effective than group 3, This means that although metformin and SAE are equally effective at lowering blood sugar levels, 500 mg metformin is more effective than 250 mg SAE.

Based on the results of research at home and abroad, it shows that there is a decrease in blood sugar levels in foods containing sapronin and flavonoids, So it can be concluded that Sunti Aceh is effective in reducing blood sugar levels(12–20).

Conclusion

Based on the results of the study, it can be concluded that groups two and three are able to lower blood glucose levels, however, group two metformin 500 mg/gr of bodyweight was more effective because it obtained a more significant value from the results of the numerical test of two paired groups with a P value = 0.000 than group three (SAE dose of 250mg/gr of bodyweight) obtained a more significant value from the results of the numerical test two paired group with P value = 0.003, So that the dried starfruit extract / sunti aceh is more effective at a dose of 250 mg/gr of bodyweight in reducing blood sugar levels than aquadest, but is also less effective than metformin 500 mg/gr of bodyweight.

Acknowledgements

The researcher expresses his gratitude to the Research Institute, Community Service and Quality Assurance of Universitas Teuku Umar for the funding that has been given to research with the Lecture Research (LR) scheme with contract number: 071/UN59.7/PT.01.03/2021.

The researchers also give thanks to those who have helped the success of this service, namely: Rector of Universitas Teuku Umar, chairman of Research Institute, Community Service and Quality Assurance of Universitas Teuku Umar, Dean of Faculty of Public Health Universitas Teuku Umar, Head of the veterinary medicine laboratory of Syiah Kuala university, and students of Department of Nutrition Faculty of Public Health Universitas Teuku Umar.

Reference

Dinas Kesehatan Kabupaten Aceh Barat. Data Sukender Profil Kesehatan Kabupaten Aceh Barat. Meulaboh; 2017.

Dinas Kesehatan Kabupaten Aceh Barat. Data Sekunder Profil Kesehatan Aceh Barat. 2019.

Dinas Kesehatan Kabupaten Aceh Barat. Data Sekunder Profil Kesehatan Aceh Barat Tahun 2018. 2018.

Vilda Ana Veria Setyawati EH. Buku Ajar : Dasar Ilmu Gizi Kesehatan Masyarakat. 1st ed. Yogyakarta: DEEPUBLISH; 2018.

Widodo A. Pengaruh Pemberian Ekstrak Buah Belimbing Wuluh (Averrhoa Blimbi L.) Terhadap Penurunan Kadar Glukosa Darah Tikus Wistar Yang Diinduksi Aloksan. J Kedokt Diponegoro [Internet]. 2018;7(4):1744–54. Available from: http://doi.org/10.14710/dmj.v7i4.22287

Kemenkes RI. Buku Panduan GERMAS (Gerakan Masyarakat Hidup Sehat). Warta Kesmas. 2017.

Eliana F. Penatalaksanaan DM Sesuai Konsensus Perkeni 2015. SATELIT Simp 61 DM Updat DAN Hb1C. 2015;

Kemenkes RI. Mari Kita Cegah Diabetik Dengan Cerdik. Kementrian Kesehatan Republik Indonesia. 2016.

Kementrian Kesehatan Republik Indonesia. Penyakit Tidak Menular Penyebab Kematian Terbanyak di Indonesia, Jakarta. Depkes RI. 2011;

Putri ES, Marniati, Sriwahyuni S, Elida S, Husna A. The effectiveness of food and physical activity patterns on the reduction of blood sugar levels in the prediabetes group. Int J Psychosoc Rehabil [Internet]. 2020;24(6):5518–25. Available from: http://doi.org/10.37200/IJPR/V24I6/PR260550

Putri ES, Rinawati R, Fera D. The Influence of Diet Menus and Sports Models on Decreased Blood Sugar Levels and Body Weight in The Prediabetes Group. JNS J Nutr Sci [Internet]. 2018;1(1):1–5. Available from: https://doi.org/10.35308/.v1i1.2218

Susanti EY. Pengaruh Pemberian Sari Belimbing Wuluh. Vol. 5. 2016. 102–115 p.

Pushparaj P, Tan CH, Tan BKH. Effects of Averrhoa bilimbi leaf extract on blood glucose and lipids in streptozotocin-diabetic rats. 2000;72:69–76. Available from: www.elsevier.com/locate/jethpharm

Guess ND. Dietary interventions for the prevention of type 2 diabetes in high-risk groups: Current state of evidence and future research needs. Nutrients [Internet]. 2018;10(9). Available from: http://doi.org/10.3390/nu10091245

Yazid EA, Suryani E. Daun Belimbing Wuluh Dan Daun Sirsak Pada Penderita Diabetes Melitus. J Sains. 2017;7(14):31–5.

Rahmah, Dina Faizatur., Marchianti, Ancah Caesarina Novi., Riyanti R. Uji Efektivitas Beras Herbal Forte terhadap Pasien Diabetes Melitus Tipe 2 di Puskesmas Sumbersari Jember. J Agromedicine Med Sci [Internet]. 2017;3(2):11–7. Available from: http://repository.unej.ac.id/bitstream/handle/123456789/65672/Ainul Latifah-101810401034.pdf?sequence=1

Poolsup N, Suksomboon N, Kurnianta PDM, Deawjaroen K. Effects of curcumin on glycemic control and lipid profile in prediabetes and type 2 diabetes mellitus: A systematic review and meta-analysis. PLoS One. 2019;14(4):1–18.

Ismawanti Z, Nurzihan NC, Prastiwi N. Demonstrasi Pengenalan Variasi Menu Diet Diabetes Mellitus Bagi Penderita Diabetes Mellitus Tipe 2. Martabe J Pengabdi Kpd Masy.

2021;4(1):56.

Permana Gy, Yunus A. Sistem Pakar Program Diet Diabetes Mellitus Tipe 2 Berdasarkan Bmi Dan Bmr Menggunakan Metode Forward Chaining Dan Constraint Satisfaction Problems (Studi Kasus: Puskesmas Manduro Ngoro).

WHO. Diabetes Programme. World Heal Organ. 2018;