

The Effect of Diabetes Exercise on Blood Sugar Level Reduction in Type 2 Diabetes Patients in Peuniti Village

Yadi Putra¹, Ayu Maisarah², Yusrika³, Nurul Sakdah⁴, M. Daud⁵

Diploma III Nursing Program, Faculty of Health Sciences, Abulyatama University, Jl. Blang Bintang Lama Km 8.5, Lampoh Keude, Aceh Besar

Email: yadi_putra@abulyatama.ac.id

The prevalence of diabetes mellitus is one of the leading causes of death. This disease also has an impact on societies globally, negatively affecting quality of life as well as relationships between individuals and within communities. The prevalence of diabetes mellitus in Indonesia stands at 1.7 per cent, with type 1 diabetes accounting for 16.9 per cent and type 2 diabetes for 50.25 per cent. High prevalence of type 2 diabetes mellitus is caused by various factors. Therefore, efforts to control blood glucose levels, including through diabetes exercise therapy, are essential. The aim of this study was to determine the effect of diabetes exercise therapy on reducing blood glucose levels in patients with type 2 diabetes in Peuniti Village, Banda Aceh City. A quantitative research method was employed, utilising a single-group quasi-experimental design with a pre-test-post-test approach. The population comprised 29 individuals with gastritis, and the sample consisted of 15 individuals with type 2 diabetes mellitus in Peuniti Village, Baiturrahman Sub-district, Banda Aceh City, selected using purposive sampling. This study was conducted from 24 May to 29 July 2025. The data were analysed using univariate and bivariate analysis with a paired t-test. The results of the study showed that, prior to the physical exercise programme for people with diabetes, the respondents' average blood glucose level was 232.3 mg/dl, whilst after the programme, it fell to 219.3 mg/dl—a reduction of 13.2 mg/dl. Based on the results of the statistical test, it was found that $p = 0.000 < 0.05$. In conclusion, there is a significant effect of exercise on diabetes

Keywords: Diabetes Exercise, Blood Sugar Levels, Diabetes Mellitus

This is an open access article under the [CC BY-NC](#) license



Corresponding Author:

Yadi Putra

Diploma III Nursing Program, Faculty of Health Sciences, Abulyatama University, Jl. Blang Bintang Lama Km 8.5, Lampoh Keude, Aceh Besar
yadi_putra@abulyatama.ac.id

1. Introduction

Diabetes mellitus (DM) is a chronic condition that occurs when blood glucose levels rise because the body cannot produce enough insulin or the insulin produced does not function properly (Firmansyah, 2022). According to data from the International Diabetes Federation (IDF), the global prevalence of DM in 2021 stood at 10.5 per cent (237 million adults) aged 20–79 years living with diabetes mellitus worldwide (Susilo et al., 2021).

The World Health Organisation (WHO, 2023) states that 422 million people worldwide have diabetes, representing approximately 8.5 per cent of the adult population, and that an estimated 2.2 million deaths are attributable to the condition, with a significant proportion of diabetes mellitus cases occurring before the age of 70, particularly in low- and middle-income countries.

The number of people with Type II Diabetes Mellitus in Indonesia is estimated to continue rising each year. By 2024, it is predicted that there will be around 16.7 million people with Type II diabetes, particularly if the public does not increase their awareness and attention to this condition. Data from the East Java Provincial Health Office shows that in 2021, there were 929,535 cases of diabetes mellitus in the region. Of this total,

around 867,257 patients (93.3 per cent) had been diagnosed and were receiving the necessary medical treatment (Sutomo, 2023).

Data on the prevalence of Type 2 Diabetes Mellitus (DM) in Aceh shows a significant trend and has become a major concern for the local government. In 2021, the number of people with DM in Aceh reached approximately 184,527, with healthcare services available at 360 community health centres (Puskesmas) across 23 regencies and cities. The regency with the highest prevalence is Aceh Singkil Regency, with 76,954 patients; however, only around 7 per cent of them received healthcare services in accordance with standards. Meanwhile, the lowest prevalence was recorded in Subulussalam City, with 480 patients, where more than 100 per cent of patients had received care, as some had been referred to other nearby healthcare facilities. Furthermore, according to data from the Baiturrahman Community Health Centre in Banda Aceh for the year 2024, there were 1,187 individuals diagnosed with type 2 diabetes mellitus in Banda Aceh; and in Peuniti Village, Baiturrahman Sub-district, Banda Aceh, in 2024, Peuniti Village recorded the highest number of type 2 diabetes cases, with 312 people affected.

2. Method

This is a quantitative study, employing a quasi-experimental design with a one-group pre-test post-test design. The study aims to investigate the effect of the independent variable (diabetes exercise) on the dependent variable (blood glucose levels), by providing an intervention to the research subjects, whereby blood glucose levels were measured before the intervention and again after the intervention.

The population comprised 312 people with diabetes mellitus, with a sample size of 15 participants selected using purposive sampling. The study took place from 23 to 31 July 2025. Data analysis using a paired t-test showed that before the diabetes exercise programme, the respondents' average blood glucose level was 232.3 mg/dl, whilst after the diabetes exercise programme, the average blood glucose level of the respondents was 219.3 mg/dl, representing a reduction of 13.2 mg/dl with a p-value of $0.000 < 0.05$; this indicates that the diabetes exercise programme can lower blood glucose levels in patients with Type 2 diabetes mellitus.

3. Results And Discussion

Table 1. Frequency Distribution Based on Respondent Characteristics in Peuniti Village, Baiturrahman Sub-district, Banda Aceh City

No	Varuabels	F	%
1	Age		
	Adults (aged 45–59)	7	46,7
	Older people (aged 60 and over)	8	53,3
	Total	15	100.0
2	Gender		
	Men	5	33,3
	Women	10	66,7
	Total	15	100.0
3	Level of education		
	Primary (Primary/Lower Secondary)	4	26,7
	Secondary (Upper Secondary)	9	60,0
	Higher Education (DIII/DIV/Bachelor's/Master's)	2	13,3
	Total	15	100.0

Table 1 shows that the majority of respondents were elderly, totalling 8 respondents (53.3 per cent); 10 respondents (66.7 per cent) were female; and 9 respondents (60 per cent) had a secondary education.

Table 2 Frequency Distribution Based on Blood Glucose Levels Before the Diabetes Exercise Programme in Peuniti Village, Baiturrahman Sub-district, Banda Aceh City

NO	Blood Sugar Levels	F	%
1	Diabetes Mellitus	15	100
Total		15	100,0

Table 2 shows that, of the 15 respondents, the majority had blood glucose levels falling within the diabetes mellitus category prior to the diabetes exercise programme, namely 15 respondents (100%).

Table 3 Frequency Distribution Based on Blood Glucose Levels Following Diabetes Exercise in Peuniti Village, Baiturrahman Sub-district, Banda Aceh City

No	Blood Sugar Levels	f	%
1	Prediabetes	6	40
2	Diabetes Mellitus	9	60
Total		15	100,0

Table 3 shows that, of the 15 respondents, following the diabetes exercise programme, the majority had blood glucose levels falling within the diabetes mellitus category (9 respondents, 60%) and the prediabetes category (6 respondents, 40%).

Table 4 The Effect of Diabetes Exercise on Blood Sugar Levels in Peuniti Village, Baiturrahman Sub-district, Banda Aceh City

Diabetes exercise	Senam Diabetes			
	Mean Pretest	Mean Posttest	Selisih	<i>p-value</i>
Pretest-Posttest	232,5	219,3	13,2	0,000

Table 4.5 shows that, prior to the diabetes exercise programme, the respondents' average blood glucose level was 232.3 mg/dl, whilst after the programme, it fell to 219.3 mg/dl—a reduction of 13.2 mg/dl with a *p-value* of 0.000. This indicates that the diabetes exercise programme has an effect on blood glucose levels in people with type 2 diabetes mellitus.

Discussion

The results of the study showed that, prior to the diabetes exercise programme, the respondents' average blood glucose level was 232.3 mg/dl, whilst after the programme, their average blood glucose level fell to 219.3, representing a reduction of 13.2 with a *p-value* of 0.000; this indicates that the diabetes exercise programme has an effect on blood glucose levels in people with type 2 diabetes mellitus.

Foot exercises carried out three times a week can improve peripheral blood flow in the feet. This increased blood flow stimulates the sensory nerves in the feet, thereby optimising nerve response. Conversely, in the control group, which did not receive any treatment such as foot exercises, sensory responses tended to remain unchanged due to the absence of physical stimulation to support improved nerve function. Neuropathy, which often affects the nerves in the feet, requires special attention and care to prevent further complications (Basri, 2021).

This is consistent with research conducted by Nislawaty (2020), which showed that the average pre-exercise blood glucose level in people with diabetes was 250.32%. Meanwhile, the average blood sugar

level after diabetes exercise was 218.98%. An observation of the impact of diabetes exercise on reducing blood sugar levels in patients with type 2 diabetes mellitus in 2018 within the working area of the Bankinan City Community Health Centre showed a p-value of $0.001 < 0.05$. According to Elis's (2022) research, in her research article, Sidoarjo reported that diabetes exercise successfully reduced blood glucose levels in diabetic patients at the Trosobo Community Health Centre, as it led to a reduction in blood glucose levels between pre-diabetes and post-diabetes exercise (p-value $0.004 < 0.05$).

It is assumed that diabetes exercise has a significant effect on blood sugar levels. The results of the study show that blood sugar levels decrease following diabetes exercise; this is because the physical activity involved in diabetes exercise increases the use of glucose by the muscles for energy, which in turn leads to a reduction in blood sugar levels in the bloodstream. Furthermore, diabetes exercise can improve insulin sensitivity, meaning that the body's cells become more responsive to insulin and can absorb glucose more efficiently.

4. Conclusion

Having conducted a study involving 15 respondents, the researcher was able to conclude that diabetes exercise therapy has an effect on blood sugar levels (p-value 0.000).

5. References

- Basri, M., Baharuddin, K., & Rahmatia, S. (2021). Pengaruh Senam Kaki Terhadap Nilai Respon Neuropati Pada Penderita Diabetes Melitus Tipe 2 Di Puskesmas Tamalanrea Makasar. *Jurnal Ilmiah Kesehatan Diagnosis*, 16(1), 40–46.
- Dewi, R., Budhiana, J., Fatmala, S. D., Yulianti, M., & Arsyi, D. N. (2023). Pengaruh Senam Diabetes terhadap Penurunan Kadar Gula Darah, Stres, dan Kecemasan Pengaruh Senam Diabetes terhadap Penurunan Kadar Gula Darah, Stres, dan Kecemasan pada Penderita Diabetes Melitus Tipe II. *Jurnal Media Karya Kesehatan*, 6(2), 300–318.
- Firmansyah, M. R. (2022). Senam Diabetes Terhadap Kadar Glukosa Darah. *Masker Medika*, 10(2), 777–781. Tautan sumber: Masker Medika [1, 2]
- International Diabetes Federation. (2022). *IDF diabetes atlas* (10th ed.).
- Nislawaty. 2020. Pengaruh Senam Diabetes Terhadap Penurunan Kadar Gula Darah Pada Penderita Diabetes Melitus Tipe II di Wilayah Kerja Puskesmas Bangkinang Kota Tahun 2018.
- Pasiak, N., & Arifianto. (2024). Pengaruh Senam Kaki Diabetes Terhadap Penurunan Kadar Glukosa Darah Pada Pasien Diabetes Mellitus Di Sendangmulyo Tembalang. 39–52.
- Putri, A. A., Junando, M., & Sukohar, A. (2024). Review Article: Patofisiologi dan Terapi Farmakologi Diabetes Melitus Tipe 2 Pada Pasien Geriatri. *Sains Medisina*, 2(5), 142–147.
- Quraisy. 2022. Faktor-Faktor Yang Berhubungan Dengan Kejadian Diabetes Mellitus Pada Pasien Rawat Jalan di RSUD Meuraxa Kota Banda Aceh. *Jurnal SAGO*, Volume (2):122–128
- Salabia, T., Rammang, S., & Fadhli, W. M. (2024). Pengaruh Senam Diabetes Terhadap Penurunan Kadar Glukosa Pada Lansia Penderita Diabetes Mellitus Tipe 2 Di UPTD Puskesmas Bungin Kecamatan Bokan Kepulauan Kabupaten Banggai Laut. 2, 1–8.
- Sutomo, S., & Purwanto, N. H. (2023). Pengaruh Konsumsi Tisane Daun Belimbing Wuluh Terhadap Perubahan Kadar Gula Dalam Darah Pada Penderita Diabetes Mellitus. *Jurnal Keperawatan*, 14(1), 1–23. doi.org
- World Health Organization. (2023, 5 April). Diabetes. [Lembar Fakta/Fact Sheet]. Diambil dari World Health Organization.