

Review

Progressive Muscle Relaxation Reducing Blood Sugar Levels In Diabetes Mellitus Patients: Literature Review

Ardianti Fauziah Rochmah ¹, Abdul Muhith², Chilyatiz Zahro²

¹ Rumah Luka Home Diabetic Care, East Java, Indonesia

² Faculty of Nursing and Midwifery, Nahdlatul Ulama University Surabaya, East Java, Indonesia

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ABSTRACT

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Background: Diabetes will cause many complications if it is not treated properly. Complex treatment for people living with diabetes will cause a person to experience stress, so not many sufferers comply with treatment to control blood sugar levels. This literature review aims to determine the reduction in blood sugar levels in diabetes mellitus sufferers with progressive muscle relaxation.

Methods: The method used in this article is a literature review using journal databases from Science Direct, PubMed, and Google Scholar in the 2020-2023 time period with the keywords "Progressive Muscle Relaxation or Relaxation Technique," "Blood sugar levels" and "Diabetes Mellitus

Results: The results obtained were 2,111 articles. Articles were selected according to the criteria; the result was 19 articles ready to be reviewed. From the literature review study results, it was found that progressive muscle relaxation influences reducing blood sugar levels in diabetes mellitus sufferers. Progressive muscle relaxation can relax the body so that the parasympathetic nervous system will stimulate the secretion of the hormone insulin so that it can control blood sugar levels.

Conclusion: It is hoped that people living with diabetes will increase their physical activity by doing progressive muscle relaxation twice a day to reduce blood sugar levels in diabetes mellitus sufferers.

 **Corresponding Author**


: Abdul Muhith

 **Affiliation**

: Faculty of Nursing and Midwifery, Nahdlatul Ulama University Surabaya, East Java, Indonesia

 **Email**

: abdulmuhith@unusa.ac.id

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Introduction

Diabetes is a degenerative disease that continues to increase every year and is the highest cause of death in Indonesia and the world. Diabetes is a chronic disease characterized by high blood sugar levels (hyperglycemia) caused by a disturbance in the pancreas organ, which cannot produce or produce little insulin, disrupting the body's metabolic processes.

Globally, the prevalence of diabetes in 2021 among those aged 20-79 years is estimated to be 10.5% (536.6 million people), increasing to 12.2% (783.2 million people) in 2045. The prevalence is similar in men and women and is highest in them. They are aged 75-79 years (Sun et al., 2022). According to Riskesdas, in 2018, the prevalence of diabetes was still high at 11.3%, which ranked 7th out of 10 countries



with the highest number of sufferers at 10.7 million people. Indonesia is the only country in Southeast Asia that has the highest prevalence of people living with diabetes in the world ([Rumaolat et al., 2022](#)). In East Java, the prevalence of people living with diabetes in 2021 reached 867,257 people (93.3%), with the highest sufferers in Mojokerto City at 124% of the estimated DM sufferers and the lowest in Probolinggo Regency at 51.7% of the estimated DM sufferers ([East Java Health Office, 2021](#)).

In normal people, the pancreas produces the hormone insulin from pancreatic beta cells, which regulates the amount of sugar in the blood. The body also has hormones opposite to insulin: glucagon, epinephrine, and cortisol. These hormones stimulate the liver to release glucose, increasing blood sugar levels. If there is an increase in blood sugar levels, insulin will work by absorbing enough sugar, and the rest is stored in the liver. The hormone insulin is the key to converting sugar into cells into energy. People living with Diabetes cannot control blood sugar levels due to problems with the pancreas organ, so they will experience hyperglycemia (increased blood sugar levels), as a result of which sugar is not absorbed properly in the cells ([Tandra, 2017](#); [Wahyuni, 2019](#)). Hyperglycemia is when the fasting blood sugar level is more than 125 mg/dl while the blood sugar level 2 hours after eating is more than 200 mg/dl ([Sari et al., 2022](#)).

Risk factors for increasing blood sugar levels include genetics, lifestyle, diet, and stress. Diabetes is closely related to stress. Stress will activate the neuroendocrine and sympathetic nervous systems through the hypothalamus pituitary adrenal, causing the release of epinephrine, thyroid, cortisol, and glucagon hormones, which can affect blood sugar levels. ([Ibrahim & Aisyah, 2023](#)). Stress will result in excessive production of cortisol, where cortisol works to inhibit

insulin action, which can trigger an increase in blood sugar levels ([Ekasari & Dhanny, 2022](#)). There are several non-pharmacological methods to control blood sugar levels using relaxation therapy, one of which is progressive muscle relaxation. Progressive muscle relaxation is a mind-body relaxation therapy that combines deep breathing exercises and a series of contractions and relaxation of certain muscles ([Aripsa & Nur, 2022](#); [Martuti et al., 2021](#)).

Implementing progressive muscle relaxation makes it easier for a person to focus their thoughts, and a relaxed state will be achieved more quickly. In a relaxed state, oxygen meets the needs of the entire body properly, so this condition helps achieve stable work of the adrenal glands to produce calming hormones, which will impact reducing stress. Reducing stress levels will also control blood sugar levels ([Ibrahim & Aisyah, 2023](#)). Relaxation has benefits in reducing blood glucose levels in diabetes mellitus sufferers because relaxation controls the release of hormones that have the potential to increase blood glucose levels, such as epinephrine, cortisol, glucagon, adrenocorticotrophic hormone (ACTH), corticosteroids, and thyroid. The sympathetic nervous system dominates when a person is relaxed and peaceful. This dominance of the sympathetic nervous system stimulates the hypothalamus to reduce the release of corticotropin-releasing hormone (CRH). Decreased CRH release also impacts the adenopituitary system, which reduces the release of adenocorticotrophic hormone (ACTH) into the bloodstream to the adrenal cortex. This condition inhibits the adrenal cortex from releasing the hormone cortisol. This decrease in the hormone cortisol inhibits gluconeogenesis and increases glucose use by body cells ([Sherwood, 2014](#)).

According to ([Hamidah et al., 2023](#)), progressive muscle relaxation regularly in people living with diabetes will have an impact on reducing blood glucose levels temporarily because it can create a relaxed state, thereby reducing insulin resistance and speeding up the absorption of glucose into the body's cells to meet needs. Besides that, physiologically, it can increase blood flow, speeding up the body's metabolic processes effectively.

This aligns with several studies on progressive muscle relaxation on blood glucose levels ([Akbar et al., 2018](#); [Isnaini et al., 2017](#); [Rufaida et al., 2018](#); [Sitio et al., 2022](#)). The results showed that providing progressive muscle relaxation reduced blood sugar levels in diabetes mellitus sufferers. Based on the background above, this research aims to determine the reduction in blood sugar levels in diabetes mellitus sufferers with progressive muscle relaxation.

Methods

This article uses the literature review method. Article searches were conducted in September 2023 using Science Direct, Pubmed, and Google Scholar journal databases. Journal article searches were carried out systematically from the last three years, namely 2020-2023, with search keywords, namely "Progressive Muscle Relaxation," "Relaxation Technique," "Blood sugar levels," and "Diabetes Mellitus" to search for relevant articles. Researchers will screen the articles from the selected references without exception based on the

title and abstract so that they get more and more relevant articles.

The inclusion criteria for this systematic review are 1) Respondents are diabetes mellitus patients, 2) The intervention focuses on Progressive Muscle Relaxation or Relaxation Technique, "Blood sugar levels" and "Diabetes Mellitus," 3) Article selection is not limited to methodological, population and results. Meanwhile, the exclusion criteria for this systematic review are 1) Research that is not related to Progressive Muscle Relaxation or Relaxation Technique, 2) Research that was not conducted on diabetes mellitus patients, 3) Unpublished research such as final scientific work (thesis, dissertation), conference abstracts, and case reports.

Articles that have been obtained from the database will be assessed using the PICO method by the inclusion and exclusion criteria, which contain 1) the Title of the article, 2) the Author and year of publication of the article, 3) the Research methodology (population, sample, intervention, and analysis) 4) Research results.

Results

The initial literature study found 2,111 articles (167 from Science Direct, four from Pubmed, and 1,940 from Google Scholar). After selecting according to the inclusion criteria and removing articles that were not suitable, 19 articles were found to be reviewed.

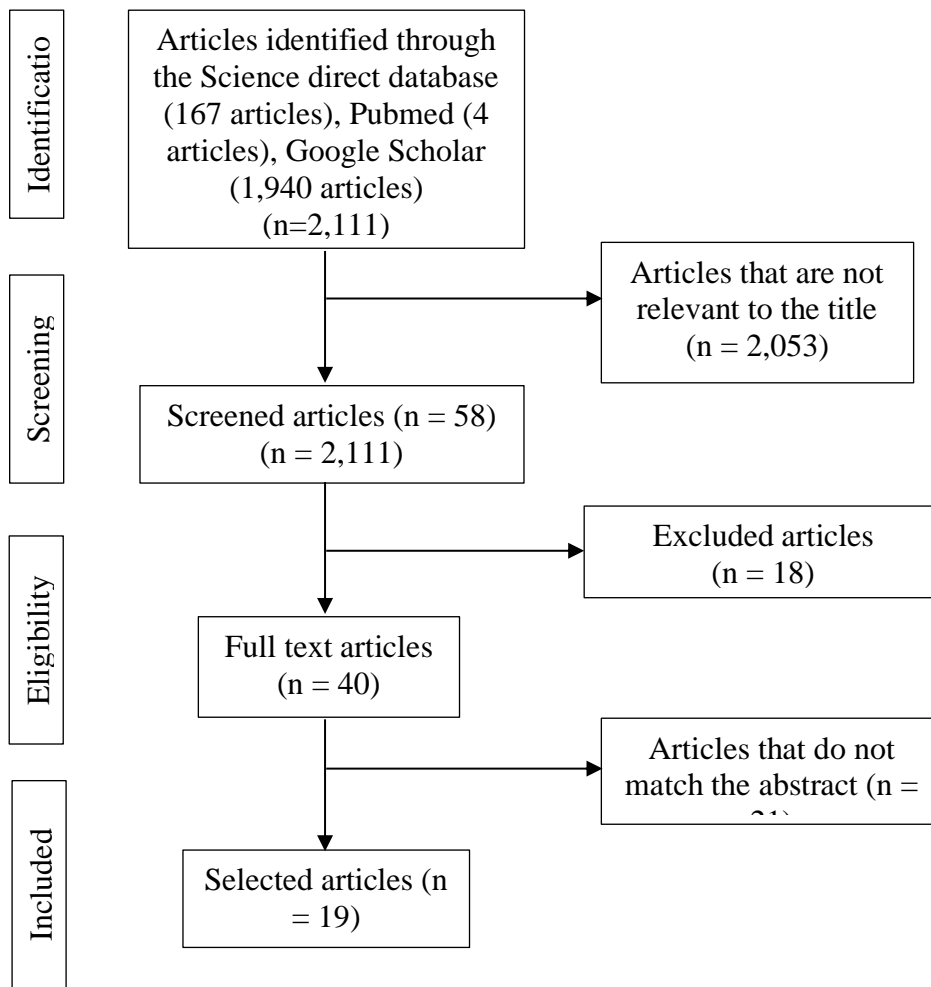


Figure 1. Literature Search Flow Diagram

Table 1. Data Distraction Method

No.	Title, Author, and Year of Article Publication	Research Methodology	Research result
1.	Pengaruh Relaksasi Otot Progresif Terhadap Penurunan Kadar Glukosa Darah: A Literature Review (Astuti et al., 2021).	Design: Literature Review Subject: 5 articles Variables: Progressive muscle relaxation and blood sugar levels Instrument: Article search via Science Direct, Elsevier, Proquest, and Google Scholar. Analysis: A search through the journal database was conducted using an advanced search with full-text articles that met the relevant inclusion and exclusion criteria and excluded articles that did not match.	The review of 5 articles that have been obtained shows that the provision of progressive muscle relaxation therapy effectively reduces blood sugar levels in diabetes mellitus patients.
2.	Progressive Muscle Relaxation Effective	Design: Pre-experimental pre-post test with one group	There was a decrease in blood sugar levels before (average

No.	Title, Author, and Year of Article Publication	Research Methodology	Research result
	Lowering Blood Glucose in Diabetes Mellitus Patients Type II (Sari et al., 2022).	Subjects: 22 respondents Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: Wilcoxon test	249.05 mg/dL) and after (average 230.36 mg/dL) administration of progressive muscle relaxation in type II diabetes mellitus patients with p-value (0.02) < (0.05).
3.	Pengaruh Progressive Muscle Relaxation Terhadap Penurunan kadar Glukosa Darah pada Penderita Diabetes Melitus Tipe 2 (Supriyatini et al., 2023).	Design: Quasi-experimental with pre-post test nonequivalent control Subjects: 21 respondents with nine intervention groups and 11 control groups. Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: dependent t-test and independent t-test	Based on the results of the dependent t-test statistical test in the intervention group p-value (0.00) < (0.05), in the control group independent t-test p-value (0.03) < (0.05), this shows that there is an effect of giving progressive muscle relaxation two times a day for three days to reduce blood glucose levels in patients with type 2 diabetes mellitus.
4.	Efektivitas Relaksasi Otot Progresif Terhadap Kadar Gula Darah: Penelitian Quasi Eksperimen pada Penderita Diabetes Melitus Tipe 2 Usia Produktif (Meilani et al., 2020).	Design: Quasi-experimental pre-post test with control group. Subjects: 24 respondents (intervention group: 12 respondents, control group: 12 respondents) Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: Independent t-test	The average blood sugar value in the intervention group was before (average 240.5 mg/dL) and after (195 mg/dL) the intervention. Meanwhile, in the control group before the intervention (average 209.5 mg/dL) and after 210.9 mg/dL. There is a difference in average blood sugar levels between the intervention group and the control group, as evidenced by the p-value (0.00) < (0.05). Progressive muscle relaxation is effective in reducing blood sugar levels in diabetes mellitus patients when done every day.
5.	Pengaruh Relaksasi Otot Progresif Terhadap Kadar Gula Darah Pasien DM Tipe 2 di RS PKU Muhammadiyah Yogyakarta (Widiastuti & KL, 2023).	Design: Quasi-experimental pre-post test control group Subjects: 73 respondents (intervention group: 36 respondents and control group: 37 respondents) Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: Wilcoxon t-test and Mann-Whitney	From the results of the Wilcoxon t-test p-value for the intervention group (0.00) < (0.05), while in the Mann-Whitney test, the control group p-value (0.00 < (0.05), it can be concluded that there is a difference between before and after progressive muscle relaxation. , and there was no difference in the control group.
6.	Pengaruh Progressive Muscle Relaxation Terhadap Penurunan Kadar Gula Darah Sewaktu pada Pasien Diabetes Melitus di Puskesmas Keling 1	Design: Quasi experimental Subjects: 50 respondents (intervention group: 25 respondents and control group: 25 respondents) Variables: Progressive muscle relaxation and blood sugar levels	There is an effect of progressive muscle relaxation in reducing sugar levels before and after intervention in diabetes mellitus patients with a p-value (0.00) < (0.05).

No.	Title, Author, and Year of Article Publication	Research Methodology	Research result
	Kabupaten Jepara (Rusnoto & Prasetyawati , 2021).	Instruments: Glucometer and observation sheet Progressive muscle relaxation exercises Analysis: Wilcoxon test	
7.	Efektivitas Relaksasi Otot Progresif pada Penderita Diabetes Melitus (Widiastuti et al. , 2022).	Design: Literature review Subject: 7 articles Variables: Progressive muscle relaxation and blood sugar levels Instrument: Search for articles via Science Direct, EBSCO, Pubmed, and Google Scholar Analysis: A search through the journal database was conducted using an advanced search with full-text articles that met the relevant inclusion and exclusion criteria and excluded articles that did not match.	The review of 7 articles that have been obtained shows that giving effective progressive muscle relaxation therapy three times for 10-15 minutes can reduce blood sugar levels in diabetes mellitus patients.
8.	Pengaruh Progressive Muscle Relaxation (PMR) Terhadap Penurunan Kadar Glukosa Darah pada Penderita Diabetes Melitus (Keswara et al. , 2021).	Design: Quasi experimental Subjects: 34 respondents (17 respondents in the intervention group and 17 respondents in the control group) Variables: Progressive muscle relaxation and blood sugar levels Instruments: pre-post test sheet and glucometer Analysis: T-test (dependent and independent sample t-test)	There is an effect of progressive muscle relaxation (PMR) on reducing blood glucose levels in diabetes mellitus sufferers for 14 days twice a day, as proven by the statistical test results p-value (0.00) < (0.05). The average blood glucose level before the intervention was (247.29 mg/dL) while after the intervention was given (210.29 mg/dL).
9.	Terapi Relaksasi Otot Progresif dalam Kadar Gula Darah Penderita Diabetes Melitus: Literature Review (L. Simanjuntak et al. , 2023).	Design: Literature review Subject: 6 articles Variables: Progressive muscle relaxation and blood sugar levels Instrument: Search through the PubMed journal database, Google Scholar 2012-2022 Analysis: A search through the journal database was conducted using an advanced search with full-text articles that met the relevant inclusion and exclusion criteria and excluded articles that did not match.	The review of 6 articles that have been obtained shows that providing progressive muscle relaxation therapy effectively reduces blood sugar levels in diabetes mellitus patients with a duration of between 15-30 minutes and a frequency of exercise of 2-3 times per day.
10.	Pengaruh Relaksasi Otot Progresif Terhadap Perubahan Kadar Gula Darah pada Pasien Diabetes Melitus di RS Trimitra (Wowor et al. , 2023).	Design: Quasi-experiment with pre-post test with control Subjects: 34 respondents (17 respondents in the intervention group and 17 respondents in the control group) Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: Wilcoxon test and Mann Whitney U	There was a significant difference before and after progressive muscle relaxation in changes in blood sugar levels in diabetes mellitus patients with Wilcoxon test results (0.00) < (0.05), and there was no significant difference in blood sugar levels in the control group.

No.	Title, Author, and Year of Article Publication	Research Methodology	Research result
11.	Pengaruh Latihan Relaksasi Otot Progresif Terhadap Kadar Gula Darah Pasien Diabetes Melitus Tipe 2 di Puskesmas Suka Makmur (Anisah et al. , 2023).	Design: Quasi experimental Subjects: 16 respondents Variables: Progressive muscle relaxation and blood sugar levels Instruments: Glucometer Analysis: Paired sample t-test	There is an effect of progressive muscle relaxation training in diabetes mellitus patients in reducing blood sugar levels with a p-value (0.00) < (0.05). With the average blood sugar level before the intervention was given (172.63 mg/dL) and after the intervention was given (130.88 mg/dL)
12.	The Effectiveness of Progressive Muscle Relaxation on Blood Sugar Levels of Type 2 Diabetes Mellitus Patients (Bistara & Susanti , 2022).	Design: Quasi-experimental pre-post test Subjects: 27 respondents (13 intervention group respondents and 14 control group respondents) Variables: Progressive Muscle relaxation and blood sugar levels Instruments: observation sheet and glucometer Analysis: Wilcoxon signed the rank test	Progressive Muscle relaxation is effective on blood sugar levels in people with diabetes mellitus p-value (0.00) < (0.05).
13.	Pengaruh Relaksasi Otot Progresif Terhadap kadar gula Darah Pasien Diabetes Melitus Tipe II di RSUD Ibnu Sutowo (Juniarti et al. , 2021).	Design: Quasi-experimental group pre-post test Subjects: 32 respondents Variables: Progressive muscle relaxation and blood sugar levels Instruments: PMR exercise SOP and blood sugar level checklist sheet Analysis: Wilcoxon test	There is an influence of Progressive Muscle Relaxation on Blood Sugar Levels in Diabetes Patients with p-value (0.00) < (0.05).
14.	Pengaruh Relaksasi Otot Terhadap Penurunan Kadar Gula Darah pada Pasien Diabetes Melitus (L. Simanjuntak et al. , 2022).	Design: Pre-experimentation Subjects: 25 respondents Variables: Muscle relaxation and blood sugar levels Instruments: Observation sheet and glucometer Analysis: Wilcoxon marked rank test	There were changes in blood sugar levels before and after muscle relaxation with p-value (0.00) < (0.05).
15.	Pengaruh Progressive Muscle Relaxation (PMR) Terhadap Perubahan Kadar Glukosa Darah pada Pasien Diabetes Melitus (Marlena et al. , 2020).	Design: Quasi Experiment Subjects: 10 respondents Variables: Progressive muscle relaxation and blood glucose levels Instruments: Glucometer and blood sugar monitoring sheet Analysis: T Test	There was a change in blood glucose levels before the intervention on average 211 mg/dL and after 196.30 mg/dL, as evidenced by the results of the T-test statistical test that p-value (0.00) < (0.05).
16.	Pengaruh Terapi Relaksasi Otot Progresif Terhadap Ketidakstabilan Kadar Gula Darah pada Pasien Diabetes Melitus Tipe II (Ferry & Wijonarko , 2023).	Design: Literature review Subject: 5 articles Variables: Progressive muscle relaxation and blood sugar levels Instrument: Search via Pubmed journal database, Google Scholar, and DOAJ Analysis: A search through the journal database was conducted using an advanced search with full-	A review of 5 articles showed that progressive muscle relaxation therapy could overcome high blood sugar levels.

No.	Title, Author, and Year of Article Publication	Research Methodology	Research result
		text articles that met the relevant inclusion and exclusion criteria and excluded articles that did not match.	
17.	Progressive Muscle Relaxation (PMR) untuk Menurunkan Kadar Gula Darah pada Pasien Diabetes Melitus Tipe 2 (Nurani & Fitriyanti , 2023).	Design: Literature review Subject: 5 articles Variables: Progressive muscle relaxation and blood sugar levels Instrument: Search via Google Scholar journal database Analysis: Search through journal databases for 2016-2021 using advanced search with full-text articles that match the relevant inclusion and exclusion criteria and remove articles that do not match.	A review of 5 articles has shown that progressive muscle relaxation (PMR) effectively reduces blood sugar levels in patients with type II diabetes mellitus.
18.	The Effect of Progressive Muscle Relaxation on Random Blood Sugar in Diabetes Mellitus Type 2 (Prameswary et al. , 2020).	Design: Literature review Subject: 8 articles Variables: Progressive Muscle Relaxation and Random Blood Sugar Instrument: Research data from source database Google Scholar, Garuda Portal, and Research Gate. Analysis: Search through the journal database in 2016-2020 by using advanced search with full-text articles that match the relevant inclusion and exclusion criteria and exclude articles that are not appropriate.	Eight research articles have presented that Progressive Muscle Relaxation effectively reduces random blood sugar levels in diabetes mellitus type 2 patients.
19.	Efektivitas Progressive Muscle Relaxation Terhadap Kadar Gula Darah Sewaktu Pasien Diabetes Melitus Tipe 2 (Ibrahim & Aisyah , 2023).	Design: Quasi-experimental group pre-post test Subjects: 30 respondents Variables: Progressive muscle relaxation and temporary blood sugar levels Instruments: Observation sheet and glucometer Analysis: Paired sample t-test	There was an effect of giving progressive muscle relaxation for 15-20 minutes 2 times a day for three days on changes in blood sugar levels in patients with type 2 diabetes mellitus as evidenced by the results of p-value (0.00) < (0.05). The average blood sugar level before the intervention was given (180.06 mg/dL) and after the intervention was given (165.68 mg/dL).

Discussion

The results of the analysis of 19 journals that have been reviewed have proven that progressive muscle relaxation can reduce blood sugar levels in both controlled and uncontrolled diabetes mellitus sufferers. Based on the analysis of 19 journals, 6 used the same method,

namely literature review, and the other 13 used quasi-experimental and pre-experiment methods.

Based on the results of research by ([Anisah et al.](#), 2023) using a group quasi-experiment, the results showed that before the intervention, the average blood sugar level was 172.63 mg/dL (with a minimum

blood sugar level of 155 mg/dL and a maximum of 201 mg/dL) then after the intervention was given the average level blood sugar to 130.88 mg/dL (with a minimum sugar level of 120 mg/dL and a maximum of 149 mg/dL), the results of statistical analysis show that p-value (0.00) < (0.05) which means there is an influence of progressive motor relaxation technique on the decrease blood sugar levels in diabetes mellitus sufferers. Research by ([Juniarti et al., 2021](#)) conducted using a one-group quasi-experiment the results showed that there was a significant difference in the blood glucose levels of diabetes mellitus patients before and after the intervention, as evidenced by the p-value (0.00) < (0.05). Research conducted by ([J. Simanjuntak et al., 2022](#)) Using pre-experiments, the results showed that there were changes in blood sugar levels before and after muscle relaxation with p-value (0.00) < (0.05). Research by ([Marlena et al., 2020](#)) using a quasi-experimental pre-post test with an average blood glucose value of the intervention of 211 mg/dL and an average after the intervention of 196.30 mg/dL, the results of the statistical test showed that the p-value (0.00) < (0.05), namely that there was an effect progressive muscle relaxation on changes in blood glucose levels in diabetes mellitus patients. According to research ([Ibrahim & Aisyah, 2023](#)), the average blood sugar level was 180.06 mg/dL before the intervention. After the intervention, the average blood sugar level was 165.68 mg/dL (with the lowest at 140 mg/dL and the highest at 300 mg/dL); statistical test results show that there is a significant difference before and after the intervention given with p-value (0.00) < (0.05).

Based on the results of ([Sari et al., 2022](#)) carried out using a quasi-experimental pre-post test method with one group, the average result was that the blood

sugar level was 249.05 mg/dL before the intervention. After the intervention, the average blood sugar level was 230.36 mg/dL; this decreased after Progressive muscle relaxation in type II diabetes mellitus patients was proven by the results of the p-value (0.02) < (0.05). Research by ([Supriyatini et al., 2023](#)) Based on the results of the dependent t-test statistical test in the intervention group p-value (0.00) < (0.05), in the control group independent t-test p-value (0.03) < (0.05), this shows that there is an effect of giving progressive muscle relaxation two times a day for three days on reducing blood glucose levels in patients with type 2 diabetes mellitus. Results of research by ([Supriyatini et al., 2023](#)) using the control group, the statistical test results obtained in the intervention group were p-value (0.00) < (0.05), meaning that there was a significant difference before and after the intervention was given. In contrast, there was no significant difference in blood glucose levels in the control group. Research by ([Meilani et al., 2020](#)) The average blood sugar value in the intervention group was before (average 240.5 mg/dL) and after (195 mg/dL) the intervention. Meanwhile, in the control group before the intervention (average 209.5 mg/dL) and after 210.9 mg/dL. There is a difference in average blood sugar levels between the intervention group and the control group, as evidenced by the p-value (0.00) < (0.05).

Research results by ([Widiastuti & KL, 2023](#)) The Wilcoxon t-test p-value was obtained for the intervention group (0.00) < (0.05). In contrast, in the Mann-Whitney test, the control group p-value was (0.00 < (0.05), so it can be concluded that there is a difference between before and after progressive muscle relaxation. There was no difference in the control group. Research by There is an effect of progressive muscle relaxation in reducing sugar levels before

and after intervention in diabetes mellitus patients with a p-value $(0.00) < (0.05)$. Research results by ([Keswara et al., 2021](#)) showed that in the treatment group before the intervention was given, the average blood glucose level was 247.29 mg/dL, while after the intervention, the average blood glucose level was 210.29 mg/dL. In the control group before the intervention, the average blood glucose level was 255.94 mg/dL, and after the intervention, the average blood glucose was 230.76 mg/dL; based on the results of statistical tests in the treatment group, it was obtained that p-value $(0.00) < (0.05)$ and in the control group p-value $(0.00) < (0.05)$ which means there is a significant difference between blood glucose levels in diabetes mellitus sufferers ([Wowor et al., 2023](#)). Research conducted by ([2022](#)) showed that Progressive Muscle Relaxation was effective in reducing blood glucose levels in diabetes mellitus patients with a p-value $(0.00) < (0.05)$.

Based on the results of several studies using the literature review method by ([Astuti et al., 2021](#) [Ferry & Wijonarko, 2023](#) [Nurani & Fitriyanti, 2023](#) [Prameswary et al., 2020](#) I. [Simanjuntak et al., 2023](#) [Widiastuti et al., 2022](#)) The results showed that there was an effect of providing progressive muscle relaxation on reducing blood sugar levels in diabetes mellitus patients. Diabetes mellitus is a chronic disease that is prone to stress and anxiety because it is related to health conditions such as treatments that must be undertaken, such as diet, controlling blood sugar levels, taking medication, and physical exercise or good physical activity. Apart from maintaining physical fitness and health, physical exercise can also help control blood sugar levels. According to ([Akbar et al., 2018](#)), Physical exercise is very important in managing diabetes mellitus; one of the physical exercises that can be done

independently is progressive muscle relaxation. Progressive muscle relaxation is a therapy given to patients that combines deep breathing exercises and a series of contractions and the relaxation of certain muscles ([Hidayah et al., 2023](#)).

According to Jacobson, progressive muscle relaxation (PMR) can increase the body's metabolism, speed up breathing, relax muscle tension, balance blood pressure, and increase alpha waves in the brain ([Trisnawati et al., 2020](#)). With consecutive progressive muscle movements for 15-20 minutes twice a day, the body will become more relaxed so that there will be changes in nerve impulses in the afferent pathways to the brain. Relaxation has benefits in reducing blood glucose levels in diabetes mellitus sufferers because relaxation controls the release of hormones that have the potential to increase blood glucose levels, such as epinephrine, cortisol, glucagon, adrenocorticotrophic hormone (ACTH), corticosteroids, and thyroid. The sympathetic nervous system dominates when a person reaches a relaxed and peaceful state. This dominance of the sympathetic nervous system stimulates the hypothalamus to reduce the release of corticotropin-releasing hormone (CRH). Decreased CRH release also impacts the adenopituitary system, which reduces the release of adenocorticotrophic hormone (ACTH) into the bloodstream to the adrenal cortex. This condition inhibits the adrenal cortex from releasing the hormone cortisol. This decrease in the hormone cortisol inhibits gluconeogenesis and increases glucose use by body cells ([Anaabawati et al., 2021](#); [Janah & Prajayanti, 2023](#); [Sherwood, 2014](#)).

In implementing progressive muscle relaxation, there are three sessions with 14 movements each to make it easier for patients to remember them. Session 1: implementation of the forehead, eyes, jaw,

mouth, and neck relaxation technique, which is done two times; Session 2: implementation of relaxation techniques on the hands, arms, and shoulders, carried out two times; Session 3: implementation of relaxation techniques on the back, chest, stomach, legs, and feet which is done two times (Nuwa, 2018). Doing progressive muscle relaxation regularly can benefit your body's health; besides gaining physical fitness, this technique can relax your body to control blood glucose levels.

Based on the results of the research above it is in line with research conducted by (Martuti et al., 2021) Regarding the application of progressive muscle relaxation to the blood sugar levels of type 2 diabetes mellitus patients in the working area of the Metro Health Center; the results showed that there was a decrease in blood sugar levels in diabetes mellitus patients before and after the intervention. Apart from that, several studies are based on the research above that have been carried out by (Akbar et al., 2018; Isnaini et al., 2017; Rufaida et al., 2018; Sitio et al., 2022). The effect of progressive muscle relaxation on blood sugar levels shows a significant reduction in giving progressive muscle relaxation to blood sugar levels in diabetes mellitus sufferers.

Conclusion

The results of this literature review show that giving progressive muscle relaxation to diabetes mellitus sufferers effectively reduces glucose levels in the blood by relaxing the body so that cortisol levels are controlled and insulin can work well to reduce sugar levels. This relaxation therapy can be done regularly daily with the rule of 2x a day for 15-20 minutes to get maximum results.

Authors Contributions

The author carries out tasks from data collection, data analysis, making discussions to making manuscripts

Conflicts of Interest

There is no conflict of interest

Acknowledgment

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