# Literature Review
# The Effect Of Progressive Muscle Relaxation On Random Blood Sugar Levels In Diabetes Mellitus Type 2

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## ABSTRACT

**Background:** Non-communicable diseases are a public health problem in Indonesia and occupy the top ten diseases that cause death and the most cases, one of which is diabetes mellitus. Diabetics can experience various long-term complications if their diabetes is not managed properly. One of the non-pharmacological therapies for people with diabetes mellitus is progressive muscle relaxation. **Purpose:** This literature review aims to determine the effect of progressive muscle relaxation on random blood sugar levels in diabetes mellitus type 2. **Methodology:** This study uses the literature review method, in searching for articles using the database Google Scholar, Garuda Portal, and Research Gate. **Results:** Based on the literature search, 8 journals were found that match criteria. The results of the analysis show that there is an effect of progressive muscle relaxation on random blood sugar levels in diabetes mellitus type 2. **Discussion:** Routine muscle tension and relaxation can increase glucose transport into cell membranes and make glucose levels more effective so that levels can approach normal or stable. **Conclusion:** It's important for people with diabetes mellitus to control their blood sugar levels, one of which is by progressive muscle relaxation. This therapy is a companion to pharmacological / medical therapy (complementary therapy).
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**Keywords:** Progressive Muscle Relaxation, Random Blood Sugar, Diabetes Mellitus Type 2

## INTRODUCTION

Non-communicable diseases are a public health problem in Indonesia, occupying the top ten diseases that cause death and the most cases, one of which is diabetes mellitus (Dewi et.all, 2020). Diabetes mellitus is often referred to as the "silent killer". The threat of complications of diabetes mellitus continues to overshadow people's lives. Around 12-20% of the world's population is estimated to have this disease and every 10 seconds in the world, someone dies due to complications (Nurrahmani, 2015). Continuously high blood sugar levels result in damage to blood vessels, nerves, and other internal structures. Diabetics can experience various long-term complications if their diabetes is not managed properly (Sari, 2020)

The main results of the 2018 Basic Health Research (Riskesdas) in Indonesia show that the prevalence of diabetes mellitus based on measurement results in the population aged 15 years according to the Perkeni consensus has increased, from 6.9% in 2013 to 10.9% in 2013. 2018 (Ministry of Health, 2018). According to the results of the Basic Health Research (Riskesdas) in the province of East Java in 2018, it was stated that the prevalence of diabetes mellitus based on a doctor's diagnosis in the population aged 15 years in East Java had increased, from 2.1% in 2013 to 2.6% in 2013. 2018, and in the city of Surabaya, there was an increase, from 4.4% in 2013 to 4.8% in 2018 (Ministry of Health, 2018).

Diabetes is a chronic (chronic) disease in the form of a metabolic disorder characterized by blood sugar levels that exceed normal limits. Type 2 diabetes mellitus is diabetes caused by an increase in blood sugar due to a decrease in low insulin secretion by the pancreas gland. (Ministry of Health, 2020). When too much sugar stays in the bloodstream for a long time, it can affect the blood vessels, nerves, eyes, kidneys, and cardiovascular system. Complications include heart attacks and strokes, severe foot infections (causing gangrene, may result in amputation), end-stage renal failure and sexual dysfunction (P2PTM, 2019).

Non-pharmacological therapy is often an option for people with diabetes mellitus because this non-pharmacological therapy is easy to do, does not cost a fortune, and does not result in fatal effects or worsen the disease state (Sukarmiasih, 2019). One of the non-pharmacological therapies for people with diabetes mellitus is progressive muscle relaxation. In a relaxed state, the brain will get optimal oxygen supply. This condition will

help achieve stable work of the adrenal glands to produce sedative hormones which will have an impact on reducing stress. If stress conditions can be controlled, blood sugar will also decrease (Hidayati, 2018). Based on the explanation that has been put forward, the authors are interested in reviewing some related literature on the effect of progressive muscle relaxation on random blood sugar levels in patients with type 2 diabetes mellitus.

## METHODS

This research method uses qualitative research methods with a literature review on the effect of progressive muscle relaxation on random blood sugar levels in patients with type 2 diabetes mellitus. The secondary data source obtained is in the form of reputable journal articles both nationally and internationally with predetermined themes (Nursalam, 2020) . The search was conducted using three databases, namely Google Scholar, Portal Garuda, Research Gate. Search articles or journals using keywords and boolean operators (AND, OR NOT or AND NOT) and adjusted to Medical Subject Heading (MeSH) with the following keywords: "Progressive Muscle Relaxation", "Progressive Muscle Relaxation", "Blood glucose" , “Blood sugar”, “Blood glucose”, “Diabetes”, “Diabetes Mellitus Type 2”. The strategy used to search for journal articles using PICOST, with the following inclusion criteria, Population: The study is aimed at people with type 2 diabetes mellitus, Intervention: Research intervention with progressive muscle relaxation therapy to reduce random blood sugar levels, Comparison: There is a control group and an intervention group or there is a pre-post test design, Output : Random blood sugar levels during type 2 diabetes mellitus, Study : Quasi Experimental, Time : Publication published from 2016-2020, Language : The languages used are Indonesian and English. After conducting a full-text search, checking for duplication and eliminating duplicate journals, conducting inclusion screening, eliminating exclusion journals and conducting a feasibility test.

## RESULTS

Table 1. Study Characteristics

| No | Databases | Total |
|---|---|---|
| 1. | *Google Scholar* | 6 |
| 2. | Portal Garuda | 1 |
| 3. | *Research Gate* | 1 |
| | **Total** | **8** |
| **No** | **Publication Year** | **Total** |
| 1. | 2016 | 1 |
| 2. | 2017 | 2 |
| 3. | 2018 | 2 |
| 4. | 2019 | 1 |
| 5. | 2020 | 2 |
| | **Total** | **8** |
| **No** | **Research Design** | **Total** |
| 1. | *Quasy Experimental Design* | 8 |
| | **Total** | **8** |
| **No** | **Languange** | **Total** |
| 1. | Indonesian | 5 |
| 2. | English | 3 |
| | **Total** | **8** |

Table 2. Characteristics of Respondents

| Author/Year | Characteristics of Respondents | | | |
|---|---|---|---|---|
| | Number of Respondents | Gender | | Age |
| | | M | F | |
| Meilani, et al / 2020 | 24 | 6 | 18 | 15-64 |
| Simanjuntak, et al / 2017 | 30 | - | - | 46-79 |
| Sari, et al / 2020 | 10 | - | - | - |
| Junaidin / 2018 | 9 | 2 | 7 | 55-60 |
| Jannah et al / 2019 | 30 | 15 | 15 | 30-60 |
| Akbar et al / 2018 | 30 | 4 | 11 | 49-51 |
| Antoni / 2017 | 66 | - | - | - |
| Avianti et al / 2016 | 48 | 8 | 40 | 38-70<br>41-70 |
| **Total** | **247** | **35** | **91** | **15-79** |

Table 3. Duration and Frequency of Progressive Muscle Relaxation Intervention

| Author/Year | Duration and Frequency |
|---|---|
| Meilani, et al / 2020 | 25 minutes |
| Simanjuntak, et al / 2017 | 15-20 minutes 3 times a day for one week |
| Sari, et al / 2020 | 15-20 minutes 3 times a day for one week |
| Junaidin / 2018 | three days with the frequency of exercise twice a day and the duration of each session ± 15 minutes and the measurement of blood glucose levels was carried out in three sessions, namely at 08.00, 12.00, and 17.00 both before and after the intervention |
| Jannah et al / 2019 | 15 minutes |
| Akbar et al / 2018 | 3 times on three consecutive days with a duration of 25-30 minutes |
| Antoni / 2017 | not listed |
| Avianti et al / 2016 | three days in a row 6 times every morning and evening |

Table 4. Effect of Progressive Muscle Relaxation on Random Blood Sugar Levels in Patients with Type 2 Diabetes Mellitus

| Author/Year | Intervention Group | | Control Group | | P Value |
|---|---|---|---|---|---|
| | Pre Test | Post Test | Pre Test | Post Test | |
| Meilani, et al / 2020 | 240,5 | 195,0 | 209,5 | 210,9 | 0,000 |
| Simanjuntak, et al / 2017 | 213,43 | 180,43 | - | - | 0,001 |
| Sari, et al / 2020 | 245,34 | 170,83 | - | - | 0,000 |
| Junaidin / 2018 | 233<br>242,8<br>233 | 157,6<br>173,4<br>157,6 | 231,25<br>245<br>235 | 212<br>227,75<br>211,25 | 0,000 |
| Jannah et al / 2019 | 313 | 276,87 | - | - | 0,000 |
| Akbar et al / 2018 | 292,07 | 211,60 | 294,13 | 230,33 | 0,000 |
| Antoni / 2017 | 218,27 | 171,61 | 217,48 | 202,58 | 0,001 |
| Avianti et al / 2016 | 262,00 | 183,87 | 151,41 | 180 | 0,000 |

## DISCUSSION

Based on the results of the analysis of 8 research articles, it showed that patients with type 2 diabetes mellitus were more female, namely 91 people compared to 35 men. This is in accordance with the theory which states that women are more at risk of suffering from type 2 diabetes mellitus than men. Women are more at risk of developing diabetes because physically women have a greater chance of increasing their body mass index. Monthly cycle syndrome (premenstrual syndrome), post-menopause which makes the distribution of body fat easily accumulate due to the hormonal process so that women are at risk of suffering from type 2 diabetes mellitus (Irawan, 2010).

The average age of the respondents in the 8 research articles is the age range of 15-79 years. The main results of the 2018 Basic Health Research (Riskesdas) in Indonesia show that the prevalence of diabetes mellitus based on measurement results in the population aged 15 years according to the Perkeni consensus has increased, from 6.9% in 2013 to 10.9% in 2013. 2018. The highest cases of diabetes mellitus based on doctor's diagnosis occurred at the age of 55-64 years, which was 6.3% (Ministry of Health, 2018). This is in line with research conducted by Chaidir (2017) which states that diabetes mellitus at the age of 55-59 years is the beginning of entering the elderly where the elderly have begun to experience a decrease in the work of the pancreas when producing insulin and this causes an increase in blood sugar levels.

Based on the results of the analysis of 8 articles found differences in the duration and frequency of implementation of the intervention. In Meilani et al's study (2020) the intervention was given for 25 minutes. In the study of Simanjuntak et al (2017) the intervention was given for 15-20 minutes 3 times a day for one week. In the study of Sari et al (2020) the intervention was given for 15-20 minutes 3 times a day for one week. In Junaidin's research (2018) the intervention was given for three days with a frequency of exercise twice a day and the duration of each session of ± 15 minutes and measurement of blood glucose levels was carried out in three sessions, namely 08.00, 12.00, and 17.00 both before and after the intervention. In the study of Jannah et al (2019) the intervention was given for 15 minutes. In the study of Akbar et al (2018) the intervention was given 3 times on three consecutive days with a duration of 25-30 minutes. In Antoni's research (2017) the duration of the intervention was not included. In the study of Avianti et al (2016) the intervention was given for three consecutive days 6 times every

morning and afternoon. Based on the research above, although there are differences in the duration and frequency of the intervention, it still shows significant changes in random blood sugar levels in patients with type 2 diabetes mellitus after Progressive Muscle Relaxation.

This is in line with research conducted by Isnaini et al (2017), by doing progressive muscle relaxation therapy regularly for 3 days with a duration of 15 minutes can increase muscle activity and increase glucose metabolism in the body and increase insulin secretion by the pancreas. Research by Herlambang et al (2019), by doing PMR exercises 2 times for 3 consecutive days can significantly reduce stress and blood sugar levels in type 2 DM patients.

Progressive muscle relaxation therapy carried out with the right procedures and routinely will get optimal results and benefits so that it can control the stability of blood sugar levels. In addition, it is also necessary to conduct future research to see the effectiveness of progressive muscle relaxation therapy on blood sugar levels by differentiating the duration and frequency of therapy based on previous research.

Based on the results of the analysis of 8 articles, the research of Simanjuntak et al (2017), Sari et al (2020), and Jannah et al (2019) used the same analytical test, namely the T dependent test. In the research of Akbar et al (2018) and Antoni (2017) using the same analytical test, namely the dependent T test and the Independent T test. In the research of Meilani et al (2020) using the Independent T test analysis test. In the research of Avianti et al (2016) using the Wilcoxon-Mann Whitney Test analysis test. Of the 8 research articles above, the most widely used analytical test is the dependent T test. Dependent sample t-test or paired sample t-test is a type of statistical test that aims to compare the average of two groups in pairs. Paired samples can be interpreted as a sample with the same subject but experiencing two different measurements, namely measurements before and after the treatment is given (Miftakhul'Ulum et al, 2016)

Based on the results of the analysis of 8 articles, all articles use the same research method namely quasi-experimental. In the research of Simanjuntak et al (2017), Sari et al (2020), and Jannah et al (2019) applying a one group pre-post test design approach. In the research of Meilani et al (2020), Junaidin (2018), Akbar et al (2018), Antoni (2017), and Avianti (2016) applied a pre-post test approach with control group design. The control group is the group that is not given or subject to treatment. The control group works as a comparison to find out the differences that may appear between the experimental group and the control group (Soesilo, 2018). Therefore, it is better if the control group is included in the study as a comparison.

Based on the analysis of 8 research articles, it was found that patients with type 2 diabetes mellitus experienced a significant decrease in random blood sugar levels after a progressive muscle relaxation intervention. Meilani et al's research (2020) showed that the average blood sugar level before and after progressive muscle relaxation in the intervention group was 240.5 mg/dl and 195.0 mg/dl then in the control group was 209.5 mg/dl. dl and 10.9 mg/dl with a p value of 0.000. Research by Simanjuntak, et al (2017) showed that the average blood sugar levels before and after progressive muscle relaxation were 213.43 mg/dl and 180.43 mg/dl with a p value of 0.001. Sari's research, et al (2020) showed that the average blood sugar before and before progressive muscle relaxation was 245.34 mg/dl and 170.83 mg/dl with p value = 0.000. Junaidin's research (2018) shows that there are differences in the average KGD both at 08.00, 12.00, and 17.00 before and after progressive muscle relaxation exercises, namely a decrease in blood glucose levels. Research by Jannah, et al (2019) showed that the average value of blood sugar levels before and after progressive muscle relaxation was 313 mg/dl and 276.87 mg/dl with a p value of 0.000. Research by Akbar, et al (2018) showed that the average pretest and posttest blood glucose levels in the intervention group were 292.07 mg/dl and 211.60 mg/dl, then the control group was 294.13 mg/dl and 230.33 mg/dl. etc. Paired t-test in the intervention group showed a p-value of 0.000 and the independent t-test in the control group showed a p-value = 0.015. Antoni's research (2017) showed that the average pretest and posttest blood glucose levels in the intervention group were 218.27 mg/dl and 171.61 mg/dl then the control group was 217.48 mg/dl and 202.58 mg/dl with a value of p. 0.001. Avianti's research, et al (2016) showed that the average KGD of the treatment group before and after progressive muscle relaxation was 262.00 mg/dl and 183.87 mg/dl then the control group was 151.41 and 180 mg/dl with values p = 0.000.

This is in line with research conducted by Hasaini (2015) which states that progressive muscle relaxation exercises can be done as a physical exercise for DM patients. This exercise is done to get relaxation by tensing and relaxing muscles. By routinely tensing and stretching the muscles, this has an impact on the transport of glucose into the cell membrane, this makes the use of glucose levels more effective so that levels can be close to normal or stable. Blood sugar levels in DM patients are related to the stress they face. Stress activates the neuroendocrine system and sympathetic nervous system through the pituitary-adrenal hypothalamus, causing hormones such as epinephrine, cortisol, glucagon, ACT, corticosteroids, and thyroid that can affect blood glucose levels in diabetics. Progressive Muscle Relaxation is a non-pharmacological therapy, the benefits of Progressive Muscle Relaxation will be seen if it is done regularly. That way, a person will find it easier to think and a relaxed state will be achieved more quickly. In a relaxed state, the brain will get optimal oxygen supply. Oxygen that meets all areas of the brain will circulate along with the heart to distribute to all organs of the body. This condition will help achieve the stability of adrenal work to produce calming hormones which will have an impact on reducing stress. This is

contrary to the impact of stress itself where under stress conditions the blood sugar in DM patients will increase. If stress conditions can be controlled, blood sugar will also decrease (Hidayati, 2018).

Type 2 diabetes mellitus is diabetes caused by an increase in blood sugar due to a decrease in low insulin secretion by the pancreas gland. The management and management of DM are 4 pillars of DM management: education, medical nutrition therapy, physical exercise and pharmacological intervention. Physical exercise is one of them with relaxation such as progressive muscle relaxation. This non-pharmacological therapy is often an option for people with diabetes mellitus because it easy to do, does not cost a fortune, does not result in fatal effects or worsen the disease state and can be used as a companion to pharmacological/medical therapy (complementary therapy). Continuously high blood sugar levels result in damage to blood vessels, nerves, and other internal structures. Diabetics can experience various long-term complications if their diabetes is not managed properly. Therefore, it is important for people with diabetes mellitus to control their blood sugar levels, one of which can be done, one of which is progressive muscle relaxation, relaxation therapy by tightening and relaxing the muscles in one part of the body at a time to provide a feeling of physical relaxation. This results in increased glucose transport into cell membranes. This increase makes the use of glucose levels more effective so that levels can be close to normal or stable. In addition, this relaxed condition helps achieve the stability of the work of the adrenals to produce calming hormones which will have an impact on reducing stress and blood sugar levels. It is hoped that people with diabetes mellitus can increase their knowledge about progressive muscle relaxation, not only for health workers. In addition, family support is one of the factors that affect the regularity of blood sugar control. It is hoped that the caring family can help carry out this progressive muscle relaxation therapy.

## CONCLUSION

Based on the 8 research articles that have been presented in the results and discussion, it shows that there is an effect of Progressive Muscle Relaxation on random blood sugar levels in patients with type 2 diabetes mellitus. Type 2 diabetes mellitus is diabetes caused by an increase in sugar due to a decrease in low insulin secretion by the glands. pancreas . Continuously high blood sugar levels damage blood vessels, nerves, and other internal structures. Diabetics can experience various long-term complications if their diabetes is not managed properly. Therefore, it is important for people with diabetes mellitus to control their blood sugar levels, one of which can be done by progressive muscle relaxation.

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