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THE EFFECT OF PROGRESSIVE MUSCLE RELAXATION ON THE REDUCTION OF BLOOD SUGAR LEVELS IN TYPE II DIABETES MELLITUS PATIENTS IN KAJHU VILLAGE, BAITUSSALAM DISTRICT, ACEH BESAR REGENCY

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Abstract

The prevalence of Type 2 Diabetes Mellitus in Indonesia continues to escalate annually, with unhealthy dietary habits and insufficient physical activity identified as contributing factors to the rise in cases. Among the various approaches to mitigate the impact of Diabetes Mellitus, Progressive Muscle Relaxation therapy has emerged as a potential intervention. This study aims to assess blood sugar levels before and after the application of Progressive Muscle Relaxation therapy in patients with Type 2 Diabetes Mellitus in Kajhu Village, Baitussalam District, Aceh Besar, for the year 2023 Utilizing quantitative research methods, the study adopts a quasi-experimental design, specifically a one-group pretest and posttest design, providing treatment to respondents. Purposive sampling, based on predetermined criteria, is employed to select 12 respondents for the study, which is conducted from July 24 to August 6, 2023. The findings reveal a significant effect of Progressive Muscle Relaxation in reducing blood sugar levels in Type II Diabetes Mellitus patients, as evidenced by a p-value of 0.000. The researchers anticipate that the outcomes of this study will contribute to enhancing information, knowledge, and skills among the respondents. These findings may pave the way for further understanding and implementation of Progressive Muscle Relaxation therapy as a valuable adjunct in the management of Type 2 Diabetes Mellitus.

Keywords: *Blood Sugar Levels, Progressive Muscle Relaxation, Type 2 Diabetes Mellitus*

1. INTRODUCTION

Diabetes mellitus (DM) is a chronic disease characterized by the inability of the pancreas to produce sufficient insulin, a hormone essential for regulating blood glucose levels. In cases of diabetes, the body fails to effectively utilize the insulin it produces. Uncontrolled diabetes poses significant risks, leading to severe damage to vital organs such as the heart, blood vessels, eyes, kidneys, and nerves (Wijonark, 2023).

According to the International Diabetes Federation (IDF) data from 2022, the global prevalence of diabetes mellitus among individuals aged 20-79 was 537 million. This number is projected to escalate to 643 million (1 in 9 adults) by 2030 and further increase to 784 million (1 in 8 adults) by 2045. In 2021 alone, diabetes mellitus accounted for 6.7 million deaths. Alarmingly, an estimated 44% of adults living with diabetes, approximately 240 million individuals, remain undiagnosed. Moreover, a staggering 541 million adults worldwide are at high risk of developing type 2 diabetes due to impaired glucose tolerance (Ibrahim, 2017).

The Ministry of Health of the Republic of Indonesia reported that the prevalence of diabetes mellitus in 2021 reached 19.47 million individuals. The Aceh Health Profile

for the same year documented 184,527 cases of diabetes mellitus in the Aceh region, with 97,131 individuals, or 53%, receiving services in accordance with established standards (Dinas Kesehatan Aceh, 2021). Notably, ten city districts demonstrated adherence to health service standards, including Central Aceh, West Aceh, Pidie, Southwest Aceh, Gayo Lues, Banda Aceh, Sabang, Langsa, Lhokseumawe, and Subussalam districts.

Further insights from the Aceh Besar health office reveal a notable increase in the incidence of Diabetes Mellitus in the Aceh Besar district, ranking fourth in prevalence after Pidie district. The reported number of diabetes mellitus cases in Aceh Besar was 8,752, with 5,670 individuals receiving health services for diabetes. This data underscores the urgency of addressing the rising burden of diabetes in the region, particularly in Aceh Besar, to ensure adequate healthcare services and management for affected individuals.

Diabetes mellitus encompasses various risk factors contributing to its incidence, including non-modifiable elements such as age, gender, and a family history of diabetes mellitus, alongside modifiable factors like excess body weight, inadequate physical activity, hypertension, an impaired blood lipid profile, triglycerides exceeding 250 mg/dL, and an unhealthy diet rich in sugar but low in fiber (Soelistijo & et al, 2019). Proactive efforts to control these risk factors play a crucial role in preventing diabetes mellitus and mitigating the associated fatality rate.

The management of diabetes mellitus is bifurcated into pharmacological and non-pharmacological approaches. Techniques for blood sugar control within diabetes mellitus management involve educational initiatives, medical nutrition therapy, pharmacological therapy, and physical therapy. Adherence by patients with type 2 diabetes mellitus to all four management aspects, as outlined by PERKENI in 2015, significantly aids in effectively controlling blood sugar levels (PERKENI, 2015). This emphasizes the importance of patient compliance in implementing comprehensive diabetes management strategies to enhance overall health outcomes.

As the incidence of type 2 diabetes mellitus cases in Indonesia continues to rise, proper management becomes crucial to prevent or slow down the emergence of complications. This involves implementing self-management behaviors in everyday life, including maintaining a healthy diet, engaging in regular physical activity, reducing stress, and fostering high motivation to sustain a healthy condition. Insulin therapy administered to diabetes mellitus patients has been shown to effectively reduce blood sugar levels (Anisah et al., 2023).

Beyond preventive behaviors like healthy eating, physical activity, stress reduction, regular medication intake, and blood glucose monitoring, individuals with diabetes mellitus are encouraged to engage in self-care with a high level of ability and confidence. Non-pharmacological therapies are frequently employed to reduce blood sugar levels, as emphasized by Anisah et al. (2023). One effective non-pharmacological approach is progressive muscle relaxation therapy, wherein the relaxation of muscles through full-body muscle tension reduction has been demonstrated to lower blood glucose levels. This highlights the significance of incorporating non-pharmacological strategies, such as progressive muscle relaxation therapy, in the comprehensive management of diabetes mellitus.

Progressive muscle relaxation stands out as a component of physical activity known to effectively lower blood glucose levels in individuals with diabetes mellitus. This effect is attributed to the inhibitory process during the release of hormones that can stimulate an increase in blood glucose levels. Notable hormones in this process include epinephrine, cortisol, glucagon, adrenocorticotropic hormone (ACTH), corticosteroids, and thyroid hormones. The autonomic nervous system plays a pivotal role, particularly in inducing relaxation and a state of calmness (Anisah et al., 2023).

In the course of observations and interviews conducted on May 29-30, 2023, involving 47 individuals diagnosed with type 2 diabetes mellitus in Kajhu village, Baitussalam District, Aceh Besar Regency, it was observed that the average blood sugar level ranged from 200 to 300 mg/dl. In instances of illness, the residents of Kajhu predominantly turn to the local health center (*puskesmas*) for disease control. Remarkably, a majority of the inhabitants in Kajhu village are unaware of the potential of Progressive Muscle Relaxation therapy in lowering blood sugar levels. Common practices among individuals with Type 2 Diabetes Mellitus in the area involve efforts such as reducing excessive sugar intake and abstaining from certain foods and beverages like tea, coffee, soft drinks, juice, and donuts as means to regulate blood sugar levels.

The purpose of this study was to determine blood sugar levels before and after being given progressive muscle relaxation in patients with Type 2 Diabetes Mellitus in Kajhu Village, Baitussalam District, Aceh Besar Year 2023.

2. RESEARCH METHODS

The research employed quantitative methods, adopting a quasi-experimental design, specifically a pseudo-experimental research approach utilizing a One-Group Pretest and Posttest design. The sample size consisted of 47 respondents. The research was conducted from July 24 to August 6, 2023. Data analysis involved both univariate and bivariate analyses, with the latter utilizing the paired t-test for statistical examination.

3. RESULTS AND DISCUSSION

3.1. Results

Table 1. Demographic Data

No.	Variables	Category	f	%
1.	Age	Early Elderly	5	42
		Late Elderly	5	42
		Late Adulthood	2	16
2.	Gender	Male	5	58,3
		Female	7	41,7
3.	Education	Junior High School	3	16,7
		High School	7	58,3
		Higher Education	2	25
4.	Jobs	Housewives	6	50
		Self-employed	6	50

Source: Primary Data 2023

Based on the information presented in Table 1 above, it is observed that among the 12 respondents, the majority (41%) belonged to the early elderly age group. In terms of gender, a significant proportion (41.7%) were female. Regarding educational background, the majority (58.3%) had completed high school. Furthermore, in terms of occupation, half of the respondents (50%) identified as housewives.

Table 2. Univariate Analysis

No.	Variables	Category	f	%
1.	Pretest giving progressive muscle relaxation technique treatment	Normal	5	41,7
		Not Normal	7	58,3
2.	Posttest provides treatment of progressive muscle relaxation techniques	Normal	11	91,7
		Not Normal	1	0,83

Source: Primary Data 2023

Referring to Table 2 presented above, it is evident that among the 12 respondents who underwent pretest treatment using progressive muscle relaxation techniques, a notable proportion (41.7%) exhibited normal conditions. Following the posttest application of progressive muscle relaxation techniques, a substantial increase was observed, with the majority (91.7%) now demonstrating normal conditions.

Table 3. Bivariate Analysis

No.	Variables	Mean	Std. Deviation	*p value*
1.	Pretest	2.284	28.095	0,000
2.	Posttest	2.070	27.001	0,000

Source: Primary Data 2023

Referring to Table 3 presented above, the analysis of pretest and posttest data using the paired sample t-test resulted in a p-value of 0.000, which is less than the significance level α of 0.05. This indicates a statistically significant effect of progressive muscle relaxation therapy on reducing blood sugar levels before and after treatment in Kajhu Village, Baitussalam District, Aceh Besar.

3.2. Discussion

Diabetes mellitus (DM) is a chronic condition characterized by elevated blood glucose levels due to the body's inability to produce or effectively use insulin. Left untreated, DM can lead to acute complications such as hypoglycemia, Diabetic Ketoacidosis (DKA), and Hyperosmolar Hyperglycemic Nonketotic Syndrome (HHNK) (Anisah et al., 2023).

Analysis of factors, including age, education, and occupation, reveals age as a significant influence. Table 1 data indicates that both early and late elderly individuals constitute a substantial portion of those affected by DM, contributing to increased blood glucose levels. As age progresses, there is a heightened prevalence of diabetes mellitus

and impaired glucose tolerance. The aging process, initiating after 30 years, triggers anatomical, physiological, and biochemical changes at the cellular, tissue, and organ levels, impacting homeostatic function (Anisah et al., 2023).

DM itself is influenced by risk factors, categorized as non-modifiable (age, gender, family history) and modifiable (excess body weight, lack of physical activity, hypertension, impaired blood lipid profile, triglycerides > 250 mg/dL, and an unhealthy diet). The client's perspective underscores the correlation between age and increased blood glucose levels, with the aging process contributing to anatomical and physiological changes. Gender also plays a role, as fat accumulation in women may lead to obesity and elevated blood sugar levels (Ubaeed & Marjani, 2023).

Progressive muscle relaxation, when performed consistently and according to procedures, enhances endurance and affects positive changes in blood sugar levels. Beyond the technique itself, cultivating a healthy lifestyle is essential for blood sugar control8. Progressive muscle relaxation therapy, characterized by the sequential tightening and loosening of muscle groups, provides a sense of physical relaxation. The assumption is that blood sugar levels in DM patients decrease after progressive muscle relaxation training due to enhanced comfort, reduced muscle tension, and a calmer heart rate. This technique spans facial to leg muscles, reducing blood sugar metabolism and increasing insulin secretion in the pancreas.

4. CONCLUSION

The findings of the conducted research provide evidence supporting the efficacy of progressive muscle relaxation therapy in reducing blood sugar levels both before and after treatment. The statistical analysis revealed a significant p-value of 0.000 in Kajhu Village, Baitussalam District, Aceh Besar, indicating a tangible impact of the therapy on blood sugar regulation.

In terms of recommendations, it is advised that respondents continue engaging in physical activities, specifically embracing the practice of progressive muscle relaxation therapy twice a day on a regular basis. This routine is proposed to aid in the effective management of blood sugar levels. Additionally, individuals are encouraged to adopt healthy lifestyle patterns and make dietary choices that do not contribute to elevated blood sugar levels.

Furthermore, for the research sites, the study aims to serve as valuable information for healthcare professionals. It is hoped that health workers can utilize the insights gained from this research to implement progressive muscle relaxation therapy as an intervention for managing blood sugar levels in patients diagnosed with Diabetes Mellitus Type II in Kajhu village, Aceh Besar. This recommendation underscores the potential application of the therapy in a real-world healthcare setting, emphasizing its significance in promoting overall health and well-being.

REFERENCES

Anisah, A., Tanjung, A. I., & Iting, I. (2023). Pengaruh Latihan Relaksasi Otot Progresif terhadap Kadar Gula Darah Pasien Diabetes Melitus Tipe 2 di Puskesmas Suka Makmur. *MAHESA : Malahayati Health Student Journal*, *3*(1). https://doi.org/10.33024/mahesa.v3i1.9194

Dinas Kesehatan Aceh. (2021). *Profil Kesehatan Aceh*. Diskominfo Prov. Aceh. https://data.acehprov.go.id/id/dataset/cakupan-deteksi-dini-kanker-leher-rahim-dan-kanker-payudara

Ibrahim, A. (2017). IDF Clinical Practice Recommendation on the Diabetic Foot: A guide for healthcare professionals. In *Diabetes Research and Clinical Practice* (Vol. 127). https://doi.org/10.1016/j.diabres.2017.04.013

PERKENI. (2015). *Konsnsus Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia 2011*.

Soelistijo, S. A., & et al. (2019). Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia. *PB Perkeni*, 133.

Ubaeed, H. A., & Marjani, A. (2023). Impact of vitamin D elements in insulin sensitivity in type 2 diabetes mellitus (DM2). *Materials Today: Proceedings*, *80*, 2638–2641. https://doi.org/10.1016/J.MATPR.2021.07.004

Wijonark, F. (2023). Pengaruh Terapi Relaksasi Otot Progresif Terhadap Ketidakstabilan Kadar Glukosa Darah Pada Pasien Diabetes Melitus Tipe II. *Jurnal Keperawatan Bunda Delima*, *5*(1). https://doi.org/10.59030/jkbd.v5i1.63

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