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The Effect of Prolanis Exercise on Blood Glucose Levels in Elderly Individuals with Diabetes Mellitus

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ABSTRACT

Background:Aging is a natural process associated with a gradual decline in physical function, increasing the risk of chronic diseases such as diabetes mellitus. Physical activity plays an essential role in diabetes management, particularly in improving glycemic control among elderly individuals. Prolanis exercise is a structured physical activity program designed to support the management of chronic diseases in older adults.

Objective: This study aimed to examine the effect of Prolanis exercise on blood glucose levels among elderly patients with diabetes mellitus at the Pratama Putu Parwata Clinic.

Methods: A quantitative pre-experimental study with a one-group pretest–posttest design was conducted between March and April 2024. A total of 32 elderly patients with diabetes mellitus were selected using purposive sampling. Blood glucose levels were measured before and after the implementation of Prolanis exercise using a glucometer. Data were analyzed using paired statistical tests with a significance level of $\alpha < 0.05$.

Results: The findings showed a significant reduction in blood glucose levels following Prolanis exercise ($p < 0.05$), indicating improved glycemic control among elderly patients with diabetes mellitus.

Conclusion:
Prolanis exercise has a significant effect on reducing blood glucose levels in elderly individuals with diabetes mellitus. Regular implementation of Prolanis exercise may serve as an effective non-pharmacological strategy to support diabetes management and improve metabolic health in the elderly.

Keywords: Prolanis Exercise, Blood Sugar Levels, Elderly, Diabetes Mellitus

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INTRODUCTION

Aging is a natural and inevitable process in the human life cycle, characterized by a gradual decline in physical capacity and functional ability. As individuals grow older, they tend to become less productive, more susceptible to chronic diseases, and increasingly dependent on others. One of the major health concerns associated with aging is reduced physical activity, which can lead to unfavorable metabolic changes, including poor serum lipoprotein profiles and increased peripheral insulin resistance. These conditions significantly increase the risk of cardiovascular disease, obesity, hypertension, glucose intolerance, and diabetes mellitus (Lubis et al., 2020).

Diabetes mellitus is a chronic metabolic disorder marked by persistent hyperglycemia that, over time, causes serious damage to vital organs such as the heart, blood vessels, eyes, kidneys, and nerves. Type 2 diabetes mellitus is the most common form and predominantly affects adults and older individuals, arising from insulin resistance and inadequate insulin secretion (WHO, 2021). Globally, diabetes has become one of the fastest-growing health emergencies of the 21st century. The International Diabetes Federation (IDF) reported that more than

537 million adults were living with diabetes in 2021, a number projected to increase substantially in the coming decades. In addition, millions of individuals experience impaired glucose regulation, contributing to high diabetes-related morbidity and mortality worldwide (Ministry of Health of the Republic of Indonesia, 2022).

At the national and regional levels, diabetes mellitus continues to pose a significant public health burden. In Bali Province, diabetes mellitus is among the top ten most frequently reported diseases, with the majority of cases classified as type 2 diabetes mellitus (Utami et al., 2023). The management of type 2 diabetes mellitus requires long-term, comprehensive strategies aimed at controlling blood glucose levels and preventing vascular and neuropathic complications. Standard diabetes management includes five main pillars: education, nutritional therapy, pharmacological treatment, blood glucose monitoring, and physical activity.

Physical activity plays a crucial role in diabetes management because it enhances glucose utilization by muscles, improves insulin sensitivity, and supports better blood circulation. During physical exercise, glucose stored as glycogen in muscles and the liver is mobilized to meet increased energy demands. Regular and appropriately prescribed exercise can help maintain blood glucose homeostasis and reduce the risk of hyperglycemia (R. F. Lubis & Kanzanabilla, 2021). One form of physical activity recommended for individuals with chronic diseases, particularly older adults with diabetes, is structured exercise programs such as the Chronic Disease Management Program (Prolanis).

Prolanis is a government-initiated program implemented by the Social Health Insurance Agency (BPJS Kesehatan) using a proactive and integrated approach. The program aims to improve the quality of life of individuals with chronic diseases through cost-effective and continuous health services, including education, routine health monitoring, and physical exercise (Ansori, 2019). Prolanis exercise is specifically designed to be safe and suitable for older adults, helping maintain physical fitness, strengthen musculoskeletal function, and support metabolic health (Purba & Arianto, 2020).

Previous studies have demonstrated that Prolanis exercise can reduce blood glucose levels in elderly patients with type 2 diabetes mellitus (Handayani et al., 2023; Purba & Arianto, 2020). However, most existing studies focus on controlled or routinely implemented Prolanis programs in community or village-based settings. Limited evidence is available regarding the effectiveness of Prolanis exercise in real-world clinical settings where program implementation may be inconsistent or irregular.

Preliminary observations conducted at the Pratama Putu Parwata Clinic revealed a continuousincrease in the number of patients with diabetes mellitus, particularly among older adults. Although Prolanis activities such as education and blood glucose monitoring are integrated into routine care, structured and regular Prolanis exercise sessions are not consistently implemented. This condition raises concerns about whether the potential benefits of Prolanis exercise on blood glucose control are being optimally achieved in this clinical context.

Given the growing prevalence of diabetes among the elderly and the inconsistent implementation of structured physical exercise programs in primary healthcare settings, it is essential to evaluate the actual impact of Prolanis exercise on blood glucose levels in elderly patients with diabetes. Therefore, this study aims to examine the effect of Prolanis exercise on blood glucose levels among elderly individuals with diabetes mellitus at the Pratama Putu Parwata Clinic, providing evidence that may support the optimization of Prolanis implementation in clinical practice.

METHODS

This study employed a quantitative pre-experimental design using a one-group pretest–posttest approach. The independent variable was physical activity in the form of Prolanis exercise, while the dependent variable was blood glucose levels in elderly patients with diabetes mellitus. The study was conducted between March and April 2024 at the Pratama Putu Parwata Clinic. A total of 32 elderly patients with diabetes mellitus were selected as study participants using purposive sampling based on predetermined inclusion criteria. Blood glucose levels were measured using a standardized glucometer. The research procedure involved measuring participants' blood glucose levels before and after the implementation of Prolanis exercise. Prior to data collection, all participants were informed about the study objectives, procedures, and potential benefits, and written informed consent was obtained. Participants then received guidance and instruction on Prolanis exercise movements, followed by post-intervention blood glucose measurement, which was recorded using an observation sheet. Data analysis was preceded by a normality test using the Kolmogorov–Smirnov test. If the data were normally distributed, the paired *t*-test was applied. If the data were not normally distributed, the Wilcoxon signed-rank test was used. Statistical significance was determined at a 95% confidence level ($p \leq 0.05$).

RESULTS

Respondent characteristics and descriptive statistics in this study are as follows:

Table 1. Distribution of respondents based on gender (n = 32)

Gender	N	%
Male	15	46,9%
Female	17	53,1%
Mean : 62.78 Minimum-Maximum : 60-67 Standard deviation : 2.268		

A total of 32 elderly patients with diabetes mellitus from the Pratama Putu Parwata Clinic participated in this study. The respondents had a mean age of 62.78 years, with ages ranging from 60 to 67 years. Based on gender distribution, the majority of participants were female.

Table 2. Data Analysis Results of the Effect of Prolanis Exercise on Blood Sugar Levels in the Elderly at the Pratama Putu Parwata Clinic

Descriptive Statistics	*Pre-test*	*Post-test*	*p-Value*
Mean	199.66	187.16	0,000
Minimimum	134	132	
Maximum	258	246	
Standard deviation	32.133	29.578	

Prior to the intervention, the mean blood glucose level was 199.66 mg/dL, with values ranging from 134 to 258 mg/dL. After the implementation of Prolanis exercise, the mean blood glucose level decreased to 187.16 mg/dL, with minimum and maximum values of 132 and 246 mg/dL, respectively. Statistical analysis demonstrated a significant effect of Prolanis exercise on blood glucose levels among elderly patients with diabetes mellitus ($p < 0.05$). These findings indicate that Prolanis exercise contributed to a reduction in blood glucose levels in elderly individuals with diabetes at the Pratama Putu Parwata Clinic.

DISCUSSION

This study examined the effect of Prolanis exercise on blood glucose levels among elderly patients with diabetes mellitus at the Pratama Putu Parwata Clinic. The findings demonstrate that structured physical activity delivered through Prolanis exercise is associated with improved glycemic control in elderly individuals with diabetes. This result highlights the importance of integrating regular, appropriate physical exercise into chronic disease management programs for older adults.

The participants in this study were older adults who, according to World Health Organization criteria, fall within the elderly age group. Aging is a natural biological process characterized by progressive declines in physiological function, including reduced insulin sensitivity, decreased muscle mass, and impaired glucose metabolism. These age-related changes increase susceptibility to degenerative diseases such as type 2 diabetes mellitus and contribute to difficulties in maintaining optimal glycemic control (WHO, 2020; Nugroho, 2018). The predominance of elderly participants in this study reflects broader epidemiological trends indicating that diabetes prevalence increases substantially with advancing age (Kirkman et al., 2012).

In terms of gender distribution, the majority of participants were female. This finding is consistent with previous studies reporting a higher prevalence of diabetes among older women, particularly after menopause. Hormonal changes during menopause contribute to increased fat accumulation and insulin resistance, which elevate the risk of type 2 diabetes mellitus (Zahira & Farhan, 2020; Cindy & Saelan, 2023). These biological factors may partly explain the higher representation of female participants in studies involving elderly populations with diabetes.

Before participation in Prolanis exercise, elderly patients generally exhibited elevated blood glucose levels, indicating suboptimal glycemic control. Elevated random blood glucose levels are common among older adults with diabetes, especially in the presence of limited physical activity. According to the World Health Organization, persistent hyperglycemia reflects impaired glucose regulation and increases the risk of long-term complications such as cardiovascular disease, neuropathy, and nephropathy (WHO, 2019). This condition underscores the need for effective non-pharmacological interventions to complement medical therapy in elderly patients.

After the implementation of Prolanis exercise, participants demonstrated improved blood glucose control. Physical exercise enhances glucose uptake by skeletal muscle through both insulin-dependent and insulin-independent mechanisms. Muscle contractions stimulate the translocation of glucose transporter type 4 (GLUT-4) to the cell membrane, facilitating glucose entry into muscle cells and reducing circulating blood glucose levels (Hawley & Lessard, 2008; Colberg et al., 2016). In elderly populations, moderate-intensity, structured exercise such as Prolanis is particularly beneficial because it improves insulin sensitivity without imposing excessive physiological stress.

The observed effect of Prolanis exercise on blood glucose reduction in this study is consistent with previous research conducted in community and primary healthcare settings, which has shown that regular participation in Prolanis or similar exercise programs leads to significant improvements in glycemic control among elderly patients with diabetes (Soewito & Marlena, 2020; Dewiyanti & Cheristina, 2022). These consistent findings across different contexts suggest that Prolanis exercise is an

effective and feasible intervention for diabetes management in older adults.

From a physiological perspective, the reduction in blood glucose levels following Prolanis exercise can be explained by increased energy expenditure and enhanced metabolic efficiency. During exercise, glucose is broken down to produce adenosine triphosphate (ATP), which supplies energy for muscle contraction. This increased glucose utilization, combined with improved insulin sensitivity, contributes to lower circulating glucose levels both during and after exercise (Suradji et al., 2023). Regular physical activity also supports weight management, cardiovascular health, and overall functional capacity, which are particularly important for maintaining quality of life in elderly individuals.

This study reinforces the role of structured physical exercise as a core component of diabetes management in the elderly. Prolanis exercise represents a practical, community- and clinic-based intervention that can be integrated into routine healthcare services. By improving glycemic control and supporting metabolic health, Prolanis exercise has the potential to reduce diabetes-related complications and enhance the well-being of elderly patients with diabetes mellitus.

Implications

The findings of this study have important practical and theoretical implications for the management of diabetes mellitus among the elderly. From a practical perspective, the results support the integration of structured physical activity, such as Prolanis exercise, into routine diabetes care in primary healthcare and clinical settings. Prolanis exercise may serve as a feasible, low-cost, and safe non-pharmacological intervention to support glycemic control in elderly patients, particularly in settings where long-term lifestyle modification is challenging. Health professionals, including nurses and primary care providers, can play a key role in promoting adherence to regular Prolanis exercise as part of comprehensive chronic disease management. From a theoretical perspective, this study reinforces existing evidence that physical activity contributes to improved glucose metabolism through enhanced insulin sensitivity and increased glucose utilization in skeletal muscle. The findings also highlight the relevance of structured, age-appropriate exercise programs in addressing age-related metabolic decline among elderly individuals with diabetes mellitus.

Limitations and Recommendations

Several limitations of this study should be acknowledged. First, the use of a pre-experimental one-group pretest–posttest design without a control group limits the ability to draw strong causal conclusions regarding the effect of Prolanis exercise on blood glucose levels. Second, the relatively small sample size and the use of purposive sampling may limit the generalizability of the findings to broader elderly populations with diabetes mellitus. Third, blood glucose measurements were based on random blood glucose levels, which may be influenced by recent dietary intake and daily activity. Finally, the duration and long-term sustainability of the effects of Prolanis exercise were not assessed in this study.

Based on the findings and limitations of this study, several recommendations can be proposed. Future research should employ experimental or quasi-experimental designs with control groups and larger, more diverse samples to strengthen causal inference. Longitudinal studies are also recommended to evaluate the long-term effects of Prolanis exercise on glycemic control and diabetes-related outcomes in elderly populations. In practice, healthcare providers are encouraged to implement Prolanis exercise programs more consistently and regularly within primary care settings, accompanied by education and monitoring to enhance adherence. Policymakers and healthcare institutions may consider strengthening support for Prolanis implementation as part of integrated chronic disease management strategies for the elderly.

CONCLUSIONS

This study concludes that Prolanis exercise is associated with a significant improvement in blood glucose levels among elderly patients with diabetes mellitus at the Pratama Putu Parwata Clinic. The findings indicate that structured and age-appropriate physical activity can play an important role as a supportive, non-pharmacological approach in diabetes management for older adults. Although the study design limits causal inference, the observed improvement in glycemic control highlights the potential benefit of integrating Prolanis exercise into routine care for elderly individuals with diabetes. Prolanis exercise represents a feasible and practical intervention that may contribute to better metabolic control and support the overall health and well-being of elderly patients with diabetes mellitus.

Declaration of Interest

The authors declared no conflict of interest.

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Authors' Contributions

All authors collaborate with each other in a series of research, article writing and also the improvement process.

Data Availability

All data utilized in this study, including raw data, analyzed datasets, and supporting documents, are available from the corresponding author upon reasonable request.

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