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The Effect of The OPTIMUM Lifestyle Medicine Program on The Blood Glucose Level of Diabetes Patients in North Nias District

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Abstract

Background: The numerous research results that have been conducted previously related to regular and measured exercise, proper eating and drinking patterns, restorative sleep and rest, constructive social bonds, stress management, the range of addictive and polluting substances, and the mediation of divine power, which previously focused on single studies. **Objective**: This study aimed to determine the effectiveness of the OPTIMUM Lifestyle Medicine program on blood glucose levels in diabetes mellitus patients in North Nias Regency. **Method**: This research is an experimental study to evaluate the effect of the OPTIMUM Lifestyle Medicine program on blood glucose levels in diabetes mellitus patients in North Nias Regency. This research is an experimental study with a quantitative descriptive approach with a one-group pre-post-test design. Patients' blood sugar was measured using a glucometer every month to evaluate the intervention and program that had been given. **Results**: The majority of samples in this study were male (53.5%), aged 46-55 years (43.8%), with a bachelor's degree (31.5%), and occupations as a farmer (36.8%), and 63% of those suffering from diabetes for 2-9 years. Patients' blood glucose levels before the OPTIMUM lifestyle medicine intervention were 214 mg/dL, decreasing to 204 mg/dL. Statistically, the Wilcoxon test showed a significant decrease in blood glucose before and after the intervention, with a p-value of 0.000. **Discussion**: These results indicate a decrease in the average GDS levels in respondents, although the average GDS levels have not yet entered the normal range. Statistical test analysis also showed that the Wilcoxon hypothesis analysis was accepted. **Conclusion**: The OPTIMUM Lifestyle Medicine program focuses on lifestyle changes among respondents. The research found that the OPTIMUM Lifestyle Medicine program had an effect on blood glucose levels.

Keywords: blood glucose level, diabetes, interventions, OPTIMUM lifestyle medicine, patients

INTRODUCTION

According to 2021 data from the International Diabetes Federation (IDF), Indonesia has a high prevalence of diabetes mellitus, with 10.8% of the 179,720,500 adult population affected, bringing the total number of cases in Indonesia to 19.4 million [1]. Survey results from the 2018 North Sumatra Basic Health Research showed that North Nias contributed

661 cases of diabetes diagnosed by doctors. Meanwhile, the total prevalence of diabetes mellitus in North Sumatra was 69,517 [2].

Various studies show that regular and measured exercise/olahraga (O), proper eating and drinking patterns/pola makan (P), restorative sleep and rest/Tidur dan istirahat yang restoratif (T), constructive social ties/Ikatan sosial yang membangun (I), stress management/manajemen stres (M), a series of addictive and polluting substances/Ungkaian zat adiktif dan polutif (U) and divine power mediation/Mediasi kuasa ilahi (M) or abbreviated as OPTIMUM can keep the blood glucose of diabetes patients stable. Exercise has a significant impact on dyslipidemia, with physical activity known to lower levels of Proprotein Convertase Subtilisin/Kexin Type 9 (PSCK9), which regulates LDL receptors [3,4]. Dietary adjustments and proper fluid intake influence blood glucose levels in individuals with diabetes; excessive consumption of simple carbohydrates and sugars can cause spikes in blood glucose levels, while saturated fats can potentially trigger insulin resistance [5–7]. Quality sleep and recovery play a role in influencing blood glucose levels; people with diabetes often experience difficulty sleeping due to various factors, such as the urge to urinate at night, which can affect the quality of their sleep and rest [8]. This, in turn, impairs the immune response, endocrine metabolism, and cardiovascular function, where disruption of endocrine metabolism can lead to problems with glucose tolerance. Positive social relationships impact blood glucose levels, blood pressure, and plasma lipid profiles, as these three factors are indicators of chronic disease. Chronic disease is a long-term condition that can affect a person's physical and mental health, and this decline in mental health can lead to stress [9,10].

Emotional stress management affects blood glucose levels, blood pressure, and plasma lipid patterns. Emotional stress affects the body's hormonal and metabolic systems. Stress triggers the release of glucocorticoids and catecholamines [11,12]. These hormones significantly impact various metabolic processes, including fat metabolism and influence gluconeogenesis, the process of breaking down glycogen into glucose. The impact of addictive substances and pollutants such as cigarettes on blood glucose, blood pressure, and plasma lipid patterns is due to the presence of nicotine in cigarettes; nicotine plays a role in activating catecholamine hormones, which cause a decrease in insulin levels, resulting in an increase in blood glucose. The intermediary of divine power, often referred to as religiosity, also contributes to glucose levels, blood pressure, and plasma lipid profiles. Religiosity describes a person's condition of seeking to draw closer to the Creator through spiritual practices, thereby achieving inner peace. The peace obtained through worship and other religious activities is equivalent to the ability to manage stress better [13–15].

The numerous research results that have been conducted previously related to regular and measured exercise, proper eating and drinking patterns, restorative sleep and rest, constructive social bonds, stress management, the range of addictive and polluting substances and the mediation of divine power, which previously focused on single studies, so researchers want to combine these programs into a comprehensive program in lifestyle medicine. This study aims to determine the effectiveness of the OPTIMUM Lifestyle

Medicine program on blood glucose levels in diabetes mellitus patients in North Nias Regency.

METHOD

This research is an experimental study to evaluate the effect of the OPTIMUM Lifestyle Medicine program on blood glucose levels in patients with diabetes mellitus in North Nias Regency. This research is an experimental study with a quantitative descriptive approach with a one-group pre-posttest design. The location of this research is at the North Nias Regency community health center. In this study, the intervention group received treatment, namely the provision of the OPTIMUM Lifestyle Medicine program, and was then evaluated after 3 months. Patients' blood sugar was measured using a glucometer every month to evaluate the intervention and program that had been given.

RESULTS AND DISCUSSION

The demographic and clinical characteristics of the respondents, showing a slightly higher proportion of males (53.5%). Most participants are in the middle-aged group, particularly 46–55 years (43.8%). Educational levels vary, with a notable proportion holding a bachelor's degree (31.5%), although 21% have not attended school. In terms of occupation, the majority are civil servants (45.6%) and farmers (36.8%). Regarding disease duration, most respondents (63%) have experienced diabetes for 2–9 years, indicating that the study population is largely middle-aged with diverse educational backgrounds and a moderate duration of disease (Table 1)

Table 1. Respondent characteristics

Variables	Frequency (n)	Percentage (%)
Gender		
Female	53	46,5
Male	61	53,5
Age		
29-35 years	11	9,6
36-45 years	33	29
46-55 years	50	43,8
56-61 years	20	17,5
Educations		
Not in school	24	21
Elementary school	15	13,1
Junior high school	9	7,9
Senior high school	19	16,6
Bachelor degree	36	31,5
Master degree	11	9,6
Occupations		
Civil servant	52	45,6
Self-employed	6	5,2
Farmer	42	36,8
Others	14	12,3
Suffering from diabetes for years		
< 2 years	32	28
2-9 years	72	63
> 10 years	10	9

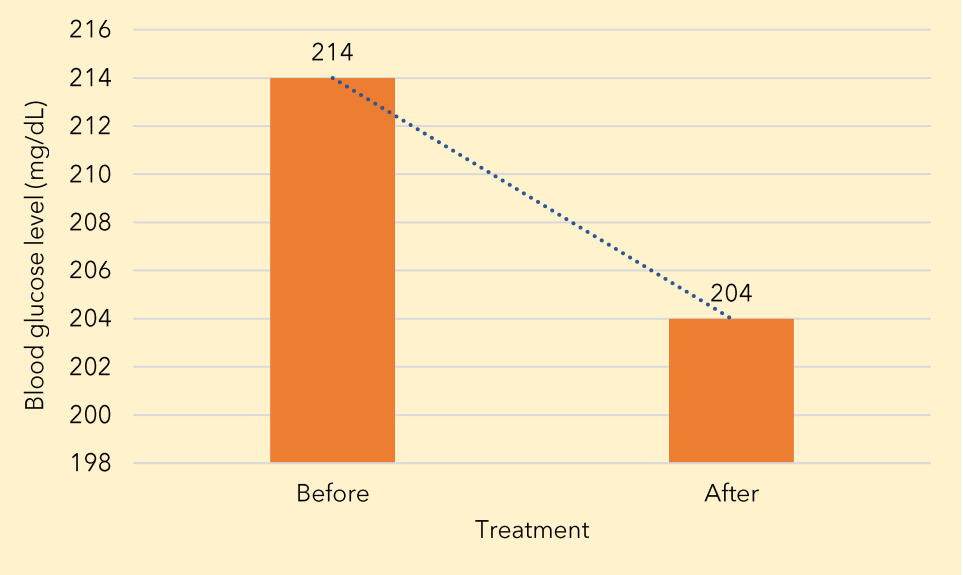

Figure 1. Average results of blood sugar measurements before and after treatment

The mean blood glucose levels of the respondents measured before and after the intervention, analyzed using the Wilcoxon test, demonstrated a statistically significant difference ($p = 0.000$), suggesting a meaningful change following the treatment. This finding indicates that the intervention administered in this study was effective in reducing blood glucose levels, thereby highlighting its potential benefit in improving glycemic control among the participants. The results showed that there was an effect of the OPTIMUM Lifestyle Medicine program on GDS levels.

In this study, random blood glucose levels were measured in a total of 114 respondents across four time points. The initial assessment was conducted on October 9, 2025 (pre-intervention), followed by subsequent measurements on October 24, November 7, and December 19, 2025 (post-intervention). The post-intervention values were averaged to obtain a representative outcome. The results showed that the mean pre-intervention blood glucose level was 214 mg/dL, which decreased to 204 mg/dL after the intervention. Although this reduction indicates an improvement in glycemic levels, the values had not yet reached the normal range. Statistical analysis using the Wilcoxon test demonstrated a significant effect, supporting the hypothesis that the OPTIMUM Lifestyle Medicine program contributed to a reduction in blood glucose levels among the respondents.

The results of this study are in line with the results of previous studies, which stated that exercise affects dyslipidemia, with exercise said to affect the reduction of Proprotein Convertase Subtilisin/Kexin Type 9 (PSCK9) levels, which play a role in regulating LDL receptors [3,4,16]. Proper regulation of eating and drinking patterns affects blood glucose levels in diabetics. Simple carbohydrates and sugar consumed excessively can cause spikes in blood glucose levels, while saturated fat can cause insulin resistance. Restorative sleep and rest affect blood glucose levels. Often, diabetic patients experience insomnia caused by many things, such as frequent urination at night. This causes the quality of sleep and rest in diabetic patients to decrease, which causes disruptions in the immune response, endocrine metabolism, and cardiovascular function. Disruption of endocrine metabolism

causes impaired glucose tolerance [8,17,18]. Building social bonds has an effect on blood glucose levels, blood pressure, and plasma lipid profiles because these three things are parameters of chronic disease, which is a disease that lasts a long time, so it can affect a person's physical and mental condition. The declining mental quality causes stress. Stress management affects blood glucose levels, blood pressure, and plasma lipid profiles. Stress affects the body's metabolic and hormonal systems [19,20]. The presence of stressors induces the release of glucocorticoid and catecholamine hormones, which affect most of the body's metabolism, one of which is fat metabolism, which affects gluconeogenesis, or the breakdown of glycogen into glucose. The effect of a series of addictive and polluting substances, namely cigarettes, on blood glucose, blood pressure, and plasma lipid profiles, because cigarettes contain nicotine, this nicotine content can activate catecholamine hormones, which cause a decrease in insulin, which causes an increase in blood glucose levels. Mediation of divine power, or often also known as religiosity, has an influence on glucose levels, blood pressure, and plasma lipid profiles [21–24]. Religiosity is a state of a person to get closer to the creator through religious practices, so that it produces peace in him. The peace obtained through worship and other religious activities is the same as being able to manage stress levels well [13,25,26].

CONCLUSION

Based on the research, the OPTIMUM Lifestyle Medicine program focuses on lifestyle changes among respondents. The research found that the OPTIMUM Lifestyle Medicine program had an effect on blood glucose levels.

REFFERENCES

[1] IDF. International Diabetes Federation Diabetes Atlas (10th ed) Brussels, Belgium: Retrieved from www.diabetesatlas.org 2021.

[2] Kemenkes. Laporan Nasional RISKESDAS 2018. https://www.litbang.kemkes.go.id/laporan-riset-kesehatan-dasar-riskesdas/.

[3] Hernández-Secorún M, Vidal-Peracho C, Márquez-Gonzalvo S, Corral-De-toro J, Müller-Thyssen-uriarte J, Rodríguez-Sanz J, et al. Exercise and manual therapy for diabetic peripheral neuropathy: A systematic review. Appl Sci 2021;11:5665. https://doi.org/10.3390/app11125665.

[4] Seth S, Yangdon KS, Gupta S. Effects of Exercises and Physiotherapeutic Modalities on Diabetes Mellitus and Its Complications-A Narrative Review. Crit Rev Phys Rehabil Med 2023;35:57–82. https://doi.org/10.1615/CritRevPhysRehabilMed.2023047343.

[5] Rai A, Misra R, Khan H, Shukla S, Patel DC, Brown A. Systematic review of the barriers and facilitators to dietary modification in people living with type 2 diabetes and pre-diabetes from South Asian ethnic populations. Diabet Med 2023;40:e15132. https://doi.org/10.1111/dme.15132.

[6] Alali RA, Alateeq SA, Almuhanna AF, Elq AH Al, Albaker WI, Habara A, et al. Dietary assessment of type 2 diabetic patients using healthful plant-based diet score in the Eastern Province of Saudi Arabia. BMC Nutr 2024;10:37. https://doi.org/10.1186/s40795-024-00843-z.

[7] Donnelly HR, Collins CE, Haslam R, White D, Tehan PE. Perceptions of Diet Quality, Advice, and Dietary Interventions in Individuals with Diabetes-Related Foot Ulceration; A Qualitative Research Study. Nutrients 2022;14:2457. https://doi.org/10.3390/nu14122457.

[8] Griggs S, Grey M, Toly VB, Hickman RL. Exploring Sleep Health in Young Adults with Type 1 Diabetes. West J Nurs Res 2021;43:1169–76. https://doi.org/10.1177/01939459211037046.

[9] Neves NWT, Breder JSC, Oliveira BA, Zanchetta FC, Barreto J, Sposito AC, et al. Diabetes-related distress and quality of life among people with type 2 diabetes at primary care level in Brazil. Acta Diabetol 2023:1–11. https://doi.org/10.1007/s00592-023-02216-7.

[10] Cervantes-Ortega M, Palma AM, Rook KS, Biegler KA, Davis KC, Janio EA, et al. Health-Related Social Control and Perceived Stress Among High-Risk Latina Mothers with Type 2 Diabetes and Their At-Risk Adult Daughters. Int J Behav Med 2023:1–10. https://doi.org/10.1007/s12529-022-10145-y.

[11] D'Amico D, Alter U, Fiocco AJ. Cumulative Stress Exposure and Cognitive Function Among Older Adults: The Moderating Role of a Healthy Lifestyle. Journals Gerontol Ser B 2023:gbad116. https://doi.org/10.1093/geronb/gbad116.

[12] Liu Y, Huang S-Y, Liu D-L, Zeng X-X, Pan X-R, Peng J. Bidirectional relationship between diabetes mellitus and depression: Mechanisms and epidemiology. World J Psychiatry 2024;14:1429–36. https://doi.org/10.5498/wjp.v14.i10.1429.

[13] Haider MM, Kamal N, Ibn Bashar M, Rahman M, Khan SH, Alam N. Religious disparities in health in Bangladesh–the case of hypertension and diabetes: evidence from two nationally representative cross-sectional surveys. BMJ Open 2023;13:e067960. https://doi.org/10.1136/bmjopen-2022-067960.

[14] Singh H, Fulton J, Mirzazada S, Saragosa M, Uleryk EM, Nelson MLA. Community-Based Culturally Tailored Education Programs for Black Communities with Cardiovascular Disease, Diabetes, Hypertension, and Stroke: Systematic Review Findings. J Racial Ethn Heal Disparities 2022:1–21. https://doi.org/10.1007/s40615-022-01474-5.

[15] Hapunda G. Coping strategies and their association with diabetes specific distress, depression and diabetes self-care among people living with diabetes in Zambia. BMC Endocr Disord 2022;22:215. https://doi.org/10.1186/s12902-022-01131-2.

[16] Lamptey R, Amoakoh-Coleman M, Djobalar B, Grobbee DE, Adjei GO, Klipstein-Grobusch K. Diabetes self-management education interventions and self-management in low-resource settings; a mixed methods study. PLoS One 2023;18:e0286974. https://doi.org/10.1371/journal.pone.0286974.

[17] Nôga DA, Meth E de M e S, Pacheco AP, Tan X, Cedernaes J, Egmond LT van, et al. Habitual Short Sleep Duration, Diet, and Development of Type 2 Diabetes in Adults. JAMA Netw Open 2024;7:e241147. https://doi.org/10.1001/jamanetworkopen.2024.1147.

[18] Liu M, Ahmed WL, Zhuo L, Yuan H, Wang S, Zhou F. Association of Sleep Patterns with Type 2 Diabetes Mellitus: A Cross-Sectional Study Based on Latent Class Analysis. Int J Environ Res Public Health 2022;20:393. https://doi.org/10.3390/ijerph20010393.

[19] Koetsenruijter J, Lieshout J Van, Vassilev I, Portillo MC, Serrano M, Knutsen I, et al. Social support systems as determinants of self-management and quality of life of people with diabetes across Europe : study protocol for an observational study. Health Qual Life Outcomes

2014;12:1–9. https://doi.org/10.1186/1477-7525-12-29.

[20] Seddigh S, Tang TS. Social support and diabetes distress: Does the messenger matter as much as the message? Chronic Illn 2022;19:681–5. https://doi.org/10.1177/17423953221102622.

[21] Aeschbacher, S., Schoen, T., Clair, C., Schillinger, P., Schonenberger, S., Risch, M., … Conen D. Association of smoking and nicotine dependence with pre-diabetes in young and healthy adults. Swiss Med Wkly, 144(September 2015), 10. 2014.

[22] Khowaja MA, Rozi S, Sawani S, Ahmed A. Factors associated with Diabetes Empowerment among patients with type 2 diabetes, at OPD setting, Karachi, Pakistan. Sci Rep 2023;13:7165. https://doi.org/10.1038/s41598-023-34385-4.

[23] Sharma S, Dong Q, Haid M, Adam J, Bizzotto R, Fernandez-Tajes JJ, et al. Role of human plasma metabolites in prediabetes and type 2 diabetes from the IMI-DIRECT study. Diabetologia 2024:1–15. https://doi.org/10.1007/s00125-024-06282-6.

[24] Rouland A, Thuillier P, Al-Salameh A, Benzerouk F, Bahougne T, Tramunt B, et al. Smoking and diabetes. Ann Endocrinol (Paris) 2024. https://doi.org/10.1016/j.ando.2024.08.001.

[25] Ibrahim AFA, Monica A, Cabansag DI. Diabetes Prevalence and Quality of Life of Female Nursing Students 2020;8:39–47. https://doi.org/10.9790/1959-0806063947.

[26] Oguntibeju O. Diabetes Mellitus Insights and Perspectives. Croatia: Intech. 2013