



Effect of benson relaxation therapy combined with Medical Nutrition Therapy (MNT) on blood sugar levels in patients with type 2 diabetes mellitus

Pengaruh terapi relaksasi benson yang dikombinasikan dengan Terapi Gizi Medis (TGM) terhadap kadar gula darah pada pasien diabetes melitus tipe 2

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Abstract

Type 2 diabetes mellitus is a chronic disease with an increasing global prevalence. Non-pharmacological approaches that may support glycemic control include Benson relaxation therapy, which focuses on stress management, and Medical Nutrition Therapy (MNT), which encompasses nutrition diagnosis, therapy, and counseling. This study aimed to analyze the effects of combining Benson relaxation therapy and MNT on blood glucose levels in patients with type 2 diabetes mellitus. Methods: A quantitative study with a quasi-experimental pretest–posttest two-group design was conducted in the North Aceh District in 2024. A total of 100 respondents participated: 50 individuals in the intervention group and 50 in the control group. The intervention consisted of daily 20-minute Benson relaxation sessions combined with MNT over a 14-day period. Data were analyzed using the Wilcoxon signed-rank test with a significance level of $p < 0,05$. Results: The mean blood glucose level in the intervention group decreased from $349,04 \pm 16,40$ mg/dL at baseline to $299,12 \pm 23,89$ mg/dL post-intervention ($p = 0,001$). In contrast, the control group showed an increase from $312,88 \pm 19,28$ mg/dL to $331,10 \pm 16,74$ mg/dL ($p = 0,042$). In conclusion, the combination of Benson relaxation therapy and MNT effectively reduced blood glucose levels in patients with type 2 diabetes mellitus and is recommended as a complementary non-pharmacological therapy.

Keywords: Blood Glucose, diabetes mellitus, nutrition therapy

Abstrak

Diabetes melitus tipe 2 merupakan salah satu penyakit kronis dengan prevalensi yang terus meningkat. Salah satu pendekatan nonfarmakologis yang dapat mendukung pengendalian kadar gula darah adalah terapi relaksasi Benson yang berfokus pada pengelolaan stres, serta *Medical Nutrition Therapy* (MNT) yang mencakup diagnosis, terapi, dan konseling gizi. Penelitian bertujuan untuk menganalisis pengaruh kombinasi relaksasi Benson dan MNT terhadap kadar gula darah pada pasien diabetes melitus tipe 2. Penelitian kuantitatif dengan desain kuasi-eksperimental dua kelompok pretes-postes dilakukan di Kabupaten Aceh Utara tahun 2024. Sebanyak 100 responden berpartisipasi, terdiri atas 50 orang kelompok perlakuan dan 50 orang kelompok kontrol. Intervensi berupa relaksasi Benson selama 20 menit setiap hari dan penerapan MNT selama 14 hari. Analisis data menggunakan uji Wilcoxon berpasangan dengan tingkat signifikansi $p < 0,05$. Hasil, rata-rata kadar gula darah pada kelompok perlakuan sebelum intervensi adalah $349,04 \pm 16,40$ mg/dL dan menurun menjadi $299,12 \pm 23,89$ mg/dL setelah intervensi ($p = 0,001$). Sebaliknya, pada kelompok kontrol terjadi peningkatan dari $312,88 \pm 19,28$ mg/dL menjadi $331,10 \pm 16,74$ mg/dL ($p = 0,042$). Kesimpulan, kombinasi relaksasi Benson dan MNT terbukti efektif menurunkan kadar gula darah pada pasien diabetes melitus tipe 2 dan direkomendasikan sebagai terapi pendukung nonfarmakologis

Kata Kunci: Diabetes melitus, gula darah, terapi gizi

Introduction

Diabetes mellitus (DM) is a chronic progressive metabolic disorder characterized by impaired carbohydrate, fat, and protein metabolism, resulting in persistent hyperglycemia (Vieira et al., 2019). Globally, diabetes is a major public health concern; more than 422 million people are affected, with the majority living in low- and middle-income countries. and approximately 1.5 million deaths annually are directly attributed to the disease (WHO, 2023). DM increases the risk of severe complications, including kidney disease, retinopathy, neuropathy, cardiovascular disease, and cerebrovascular events, which in turn contribute to a reduced quality of life and premature mortality.

Several modifiable and non-modifiable risk factors contribute to the development of type 2 diabetes mellitus (T2DM), including age, obesity, physical inactivity, hypertension, dyslipidemia, genetic predisposition, and psychosocial stress (Apovian et al., 2019). Conventional treatment strategies primarily focus on lifestyle modifications, particularly dietary management and physical activity, to reduce visceral fat accumulation and improve insulin sensitivity (Bellou et al., 2018).

In addition to pharmacological management, non-pharmacological interventions play a critical role in optimizing glycemic control. Relaxation therapies combined with structured dietary interventions are accessible and cost-effective approaches that can be implemented in both clinical and community settings (Leite, 2020; Wang et al., 2020). Among these, Benson relaxation therapy has been widely recognized as an effective complementary approach to reduce stress-related hyperglycemia. Its physiological mechanism involves suppressing the release of stress hormones such as epinephrine, cortisol, and glucagon, thereby reducing glycogenolysis, gluconeogenesis, lipolysis, and carbohydrate catabolism, ultimately leading to decreased blood glucose levels (Smeltzer, 2017). Evidence from Dewi et al. (2022) demonstrated that Benson relaxation therapy performed three times daily for 10–15 min significantly reduced blood glucose levels and promoted stress reduction in hospitalized T2DM patients.

Nutritional management plays a pivotal role in the care of diabetes. Medical Nutrition Therapy (MNT), as recommended by the

American Diabetes Association (ADA, 2022), aims to promote healthy eating patterns, improve overall diet quality, and tailor dietary plans to cultural and individual preferences. Various dietary approaches, including the Mediterranean diet and low-carbohydrate and plant-based patterns, have shown favorable effects on glycemic outcomes in patients with T2DM (Barrea et al., 2023). Furthermore, Nursihhah (2021) reported a strong association between dietary adherence and glycemic control, with individuals who failed to follow dietary recommendations having a 44-fold higher risk of uncontrolled blood glucose.

Although previous studies have examined either Benson relaxation therapy or nutritional interventions, evidence regarding their combined effectiveness in reducing blood glucose levels remains limited. Thus, integrating Benson relaxation therapy with MNT may represent a novel and holistic approach to improving glycemic control in patients with T2DM. This study aimed to evaluate the effect of Benson relaxation therapy combined with MNT on blood glucose levels in patients with type 2 diabetes mellitus in the North Aceh Regency.

Methods

This study employed a quantitative approach with a quasi-experimental design using a pre-test–post-test control group framework. This design was applied to assess the effect of Benson relaxation therapy combined with Medical Nutrition Therapy (MNT) on blood glucose levels in patients with type 2 diabetes mellitus. The intervention group received modified Benson relaxation therapy combined with MNT for 14 consecutive days, whereas the control group received Benson relaxation therapy only. This study was conducted in North Aceh Regency, Indonesia, from May to October 2024.

The study population consisted of patients with type 2 diabetes mellitus residing in the North Aceh Regency who were undergoing regular outpatient care. A total of 100 respondents were recruited, with 50 participants allocated to the intervention group and 50 to the control group. Participants were selected using purposive nonprobability sampling based on the predetermined inclusion criteria: (1) diagnosis of type 2 diabetes mellitus, (2) willingness to

participate in the intervention, and (3) ability to follow the treatment procedures.

Data collection the Blood glucose levels were measured at baseline (pre-test) and after 14 days of intervention (post-test) in both the groups. Measurements were performed using a standardized glucometer (Accu-Chek Active, Roche Diagnostics, Germany), which was calibrated daily prior to use. Capillary blood samples were obtained from the fingertip using sterile lancets after participants had undergone an 8-hour overnight fast to minimize variability. All measurements were conducted by trained health personnel under the supervision of a research team to ensure consistency. Intervention group (E1): Blood glucose level was assessed before the initiation of Benson relaxation therapy combined with Medical Nutrition Therapy (O1) and re-assessed after 14 days of intervention (O2). Control group (E2): Blood glucose was assessed at the start of the study (O3) and after 14 days of Benson relaxation therapy (O4). The results of each participant were recorded immediately in a structured case report form (CRF) and verified by two independent researchers to reduce transcription errors.

Data processing from the case report forms (CRFs) were entered into SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Prior to the analysis, all entries were carefully verified by cross-checking the original measurement sheets to ensure accuracy. Each participant was assigned a specific code according to the group allocation and the time of measurement (pre-test or post-test). Data cleaning was performed to identify and correct missing or inconsistent values, and participants with incomplete paired data were excluded from the analysis. Finally, the pre-test and post-test blood glucose levels for both groups were summarized and presented as mean $\pm$ standard deviation (SD), minimum, and maximum values.

The statistical analysis in this study, starting from univariate analysis, was used to describe the characteristics of the participants. Bivariate analysis was conducted using the Wilcoxon signed-rank test because the data did not meet the assumption of normality and involved paired (dependent) samples. The test compared the pre- and post-intervention blood glucose levels within each group. The results demonstrated a statistically significant difference in the intervention group ($Z = -3,124$; $p = 0,002$), indicating that the combined intervention had a

significant effect on blood glucose reduction. This study adhered to the principles of research ethics including respect for autonomy, confidentiality, and beneficence. Ethical approval was obtained from the Faculty of Health, Technology, and Science, University Bumi Persada (UNBP) with approval number 51/KRE/UNBP/IV/2024.

Result and Discussion

Table 1 presents the baseline characteristics of the respondents in the intervention and control groups. The majority of participants were aged 37–60 years (54,0%), while 46,0% were aged between 20 and 36 years. In terms of gender distribution, slightly more than half of the respondents were male (52,0%), with females accounting for 48,0%. Regarding education level, most participants had completed senior high school (66,0%), followed by junior high school (15,0%), a diploma or bachelor's degree (15,0%), and elementary school (4,0%).

The results of the chi-square test showed no statistically significant differences between the intervention and control groups with respect to age, sex, and education (all $p > 0,05$). These findings indicate that the two groups were comparable and homogeneous in their baseline characteristics, thereby strengthening the validity of the subsequent analyses of the intervention effect.

Table 1. Characteristics of respondents by group

Characteristics	Intervention Group		Control Group		p-value
	(n = 50)		(n = 50)		
	n	%	n	%	
Age					
20–36 years	22	44,0	24	48,0	0,690
37–60 years	28	56,0	26	52,0	
Sex					
Female	23	46,0	25	50,0	0,689
Male	27	54,0	25	50,0	
Education					
Diploma-III or Bachelor	7	14,0	8	16,0	0,706
Senior High School	33	66,0	33	66,0	
Junior High School	7	14,0	8	16,0	
Elementary School	3	6,0	1	2,0	

Table 2. Comparison of pre-test and post-test blood sugar levels in treatment and control groups (n = 50)

Group	Measurement Time	Minimum (mg/dL)	Maximum (mg/dL)	Mean $\pm$ SD (mg/dL)	Differences (Mean $\pm$ SD) (mg/dL)	p-value
Treatment	Pretest	310	360	349,04 $\pm$ 16,40	49,92 $\pm$ 7,49	<0,001*
	Posttest	268	347	299,12 $\pm$ 23,89		
Control	Pretest	263	355	312,88 $\pm$ 19,28	18,22 $\pm$ 2,54	0,042*
	Posttest	310	352	331,10 $\pm$ 16,74		

* Wilcoxon signed-rank test

Table 2 shows the changes in blood sugar levels before and after the intervention in both the treatment and control groups. In the treatment group, the mean pre-test blood sugar level was 349,04 $\pm$ 16,40 mg/dL, with values ranging from 310 to 360 mg/dL. Following the intervention (Benson relaxation therapy and Medical Nutrition Therapy (MNT)), the mean blood sugar level decreased substantially to 299,12 $\pm$ 23,89 mg/dL (range: 268–347 mg/dL). This reduction was statistically significant ($p < 0,001$, Wilcoxon signed-rank test), indicating a marked improvement in glycemic control among the participants who received treatment. In contrast, the control group showed the opposite trend. The mean pre-test blood sugar level was 312,88 $\pm$ 19,28 mg/dL (range: 263–355 mg/dL), which increased to 331,10 $\pm$ 16,74 mg/dL (range: 310–352 mg/dL) at post-test. This increase was statistically significant ($p = 0,042$), suggesting a deterioration in glycemic control in the absence of intervention. Overall, these findings highlight the efficacy of the intervention in reducing blood sugar levels compared with the control condition. The results underscore the potential clinical relevance of this treatment in managing hyperglycemia and preventing further complications among at-risk patients.

The average blood sugar level in the control group decreased; however, a significant increase was observed from the pre-test to post-test measurements. This finding suggests that without appropriate intervention, glycemic control tends to deteriorate over time, which is consistent with the natural progression of type 2 diabetes mellitus (T2DM). Poor adherence to dietary recommendations and continued consumption of refined carbohydrates, red and processed meats, and sugar-sweetened beverages may contribute to worsening blood glucose levels (Pearce et al., 2021; Srouf, 2020). In contrast, studies have consistently shown that adherence to diabetes-specific diets can

effectively reduce blood sugar levels. For example, Tursina & Wedhaningrum (2018) demonstrated that implementing a structured T2DM diet at the Ngawen Klaten Health Center resulted in a reduction in mean blood sugar levels from 289,8 mg/dL to 255,3 mg/dL. These findings highlight the importance of consistent dietary management in maintaining glycemic control.

Moreover, complementary interventions such as Benson relaxation have been reported as a supportive strategy for blood sugar regulation in patients with diabetes mellitus. This technique helps reduce stress, anxiety, and emotional distress, which exacerbate hyperglycemia through neuroendocrine mechanisms. The beneficial effect of relaxation practices on glycemic outcomes has been documented in several studies (Oliveira et al., 2023; Rasmussen et al., 2020).

The increase in blood sugar levels observed in the control group further underscores the necessity of structured dietary modification and behavioral interventions. Without active measures, individuals with diabetes mellitus are at risk of worsening glycemic outcomes, as evidenced by the contrasting results between the intervention and control groups. Thus, dietary modifications and stress-reducing practices represent essential strategies for limiting the progression of hyperglycemia and preventing long-term complications in T2DM patients.

Furthermore, studies have reported that after the administration of Benson relaxation therapy and Medical Nutrition Therapy (MNT), there were differences in glucose levels between the pre- and post-intervention periods. After being on the diet for 14 days, participants' average blood glucose levels showed a significant difference in blood sugar levels after the intervention. In this study, a significant reduction in blood sugar levels was observed in

the treatment group following intervention. This finding demonstrates the efficacy of the intervention in improving glycemic control in participants with diabetes mellitus.

The significant reduction in blood sugar levels observed in the treatment group can be attributed to two primary factors: consistent implementation of Benson relaxation therapy and provision of Medical Nutrition Therapy (MNT). For 14 consecutive days, participants in the treatment group engaged in daily Benson relaxation sessions lasting 20 min and were provided with structured dietary guidelines through a diabetes-specific meal plan. Importantly, the researchers also supervised and guided the participants during the relaxation therapy sessions, ensuring proper adherence and accurate execution of the intervention. In contrast, the control group did not receive any intervention during the same period, which corresponded with an increase in post-test blood sugar levels.

These findings are consistent with those of Juwita et al. (2016), who demonstrated a significant difference ($p = 0,000$) in random blood sugar values between the treatment and control groups following Benson relaxation therapy. Benson relaxation is a well-established complementary therapy that reduces stress and physiological tension by inducing a relaxation response, which, in turn, contributes to improved glycemic control. This relaxation technique is often integrated with patients' cultural and spiritual beliefs to enhance its effectiveness and acceptability (Novita et al., 2023; Eroglu & Metin, 2022; Mardiah et al., 2022).

Furthermore, the results align with those of Almaini and Heriyanto (2019), who highlighted the importance of dietary compliance, physical activity, and treatment adherence in lowering blood sugar levels among patients with diabetes mellitus in the Rejang Tribe. Their study showed that patients who consistently followed a diabetes-specific diet were significantly more likely to maintain normal blood glucose levels ($p < 0,001$), underscoring the critical role of dietary adherence in diabetes management.

This is further supported by the recommendations of the American Diabetes Association (2019), which emphasize that nutritional therapy in diabetes management

should not only focus on controlling blood sugar levels but also on other health outcomes, such as weight, blood pressure, and the prevention of long-term complications. A balanced, culturally appropriate diet combined with structured relaxation practices represents an integrative approach to improving clinical outcomes in diabetes care.

One limitation of the present study was the relatively short intervention period of 14 days. Sustainable improvements in blood sugar control through dietary modification, relaxation therapy, and patient empowerment may require a longer duration and broader, community-based implementation. Therefore, future interventions should extend beyond two weeks to evaluate the long-term benefits of combining Benson relaxation therapy with structured nutrition programs in diabetes management.

Conclusion

This study demonstrated that the combination of Benson relaxation therapy and Medical Nutrition Therapy (MNT) significantly reduced blood sugar levels in patients with type 2 diabetes mellitus. Although the post-intervention average remained within the hyperglycemic range, the reduction observed over the 14-day period indicates that this integrative approach may serve as an effective adjunct to conventional diabetes management.

Given the short intervention duration and baseline differences, these findings should be interpreted with caution. Nevertheless, the results highlight the practical value of incorporating structured relaxation techniques and individualized dietary guidance into routine diabetes care. Health professionals, particularly nutritionists and diabetes educators, are encouraged to integrate Benson relaxation therapy with MNT as part of holistic patient education and lifestyle modification programs.

Future studies with larger sample sizes, longer follow-up periods, and randomized controlled designs are recommended to validate these findings and to establish the long-term clinical effectiveness of this combined intervention.

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