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**Review Article: Systematic Review, Meta-Analysis, Integrative Review, Scoping Review**

# THE EFFECT OF MINDFULNESS ON DIABETES MELLITUS: A SCOPING REVIEW

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**Abstract**

**Background**: This research provides a long-term effect to find out from mindfulness intervention for conditions that require, one of which is chronic illness, in accepting the condition experienced. The prevalence of chronic diseases in the world reaches 70% of cases resulting in death. World health. The aim of this research is to determine the effect of mindfulness on diabetes.
**Objective:** This study was conducted a scoping review
**Data source:** in searches using databases, Science Direct, PubMed, Scopus, and Wiley. When searching, use the keywords " mindfulness" and "diabetes". Where in screening or filtering articles, namely marking or filtering with "2019-2023", "free full text", "medicine", and "nursing". From several databases used in this research, 11 articles were analyzed as a result of the search and analysis.
**Review Methods:** The method used is Scoping Review, and it is guided by the PRISMA flowchart, and synthesis is carried out from the extraction.
**Results:** Mindfulness can improve glycemic control, reduce stress levels, improve quality of life, reduce HbA1c scores , and reduce the hormone cortisol.
**Conclusion:** The results of the review show that the effect of mindfulness on diabetes mellitus can reduce psychological stress such as stress, depression, and reduce the hormone cortisol, and increase feelings of happiness and reduce blood glucose levels in patients with type 1 diabetes and type 2 diabetes.

**Keywords:** *Mindfulness, Type 1 Diabetes Mellitus, Type 2 diabetes mellitus, Effect*



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## INTRODUCTION

The prevalence of World Health Organization (WHO) data is that around 422 million people in the world suffer from diabetes mellitus, and it will become one of the top 10 causes of death worldwide in 2022, most of whom live in low and middle income countries, and 1.5 million deaths are caused directly by diabetes every year, the number of cases and prevalence of diabetes has continued to increase for decades (World Health Organization

(WHO), 2017). Diabetes is an effective and preventable risk factor that affects 171 million people worldwide (World Health Organization (WHO), 2017).

Diabetes is a group of common metabolic disorders associated with high blood sugar levels. Diabetes is classified based on the pathogenic process that causes high blood sugar levels, with two main groups, namely type 1 and type 2 (Sayadi et al., 2022). Chronic diseases are characterized by long-term conditions and are often incurable so they must always be treated, with medication or even surgery. It is important to treat chronic diseases, but non-pharmacological treatments can also provide better and more significant impacts in dealing with chronic diseases (Andalib et al., 2023). In diabetes sufferers there are several conditions that cause deterioration, not only due to resistance to insulin, but also psychological conditions resulting from long-term illnesses, and treatment must be appropriate (Saito & Kumano, 2022).

Non-pharmacological interventions in reducing anxiety levels in chronic illnesses are included in treatment related to adaptation and self-acceptance with mindfulness training (Rehman et al., 2022). The results of Zhou et al's research show that *mindfulness-based stress reduction (MBSR)* intervention can effectively reduce anxiety symptoms in young people (Zhou et al., 2020). Results from research by Alhawatmeh et al., 2022 showed that mindfulness significantly reduced levels of perceived stress and improved self-awareness, emotional regulation, and quality of life in the experimental group compared to the control group (Alhawatmeh et al., 2022). Previous research has shown that the effectiveness of *mindfulness* can reduce various psychological problems but has not shown how long the effects of *mindfulness* will last. This study aims to analyze the effect of *mindfulness* in people with type 1 diabetes and type 2 diabetes on their psychological state and physical condition.

## METHODS

### *Design*

This research uses a research *design* with a *scoping review approach* . This research aims to collect literature related to the effects of *mindfulness* on diabetes. The population in this study was diabetes sufferers, the intervention was mindfulness therapy, and the results obtained were the effects of mindfulness on diabetes sufferers. And this scoping riview acquires a five stage categorization technique, which include :.1. Establishing research issue, 2. Identifying relevant literatur, 3. Preferring literature, and 4. Mapping or summarizing data, 5. Collectin, summarizing, and reporting findings to comprehenively summarizing research.

### *Search methods*

In mapping articles, the data is filtered by the author using special criteria or inclusion and exclusion. In this article, the criteria referred to are articles published in the period 2019-2023, articles about the effects of *mindfulness* on chronic disease, fully published articles that can be accessed, articles published in English and Indonesian, articles conducted abroad or in Indonesia, articles quantitative or qualitative according to the specified variables.

Article searches are carried out using electronic databases or internet searches. Several databases are used for

selecting articles, namely: 1. ScienceDirect, 2. Pubmed, 3. Wiley, 4. Scopus. When searching, use the keywords "*mindfulness*" *and* "*diabetes*". Where in *screening* or filtering articles, namely marking or filtering with "2019-2023", "free full text", "medicine", and "nursing".

The next step taken was selecting each article, in this stage the literature or articles obtained from all electronic databases with various inclusion criteria and keywords, where in the overall search the total number obtained from four databases was used as the final result, namely 11 articles.

*Search outcome*

In preparing this *Scooping review*, process data is shown using a scoping prism according to JBI

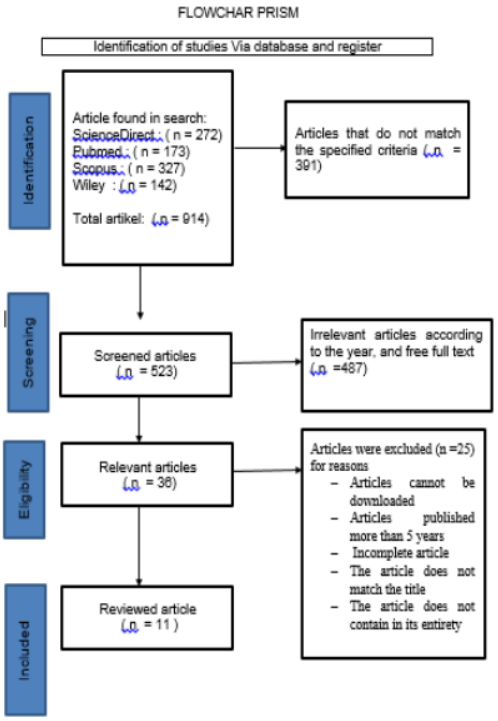


**Figure 1**. PRISMA Flowchart of literature search and screening strategy

*Quality Appraisal*

Data is analyzed by summarizing the results obtained from the topic and producing themes. In achieving the objectives of this scoping review regarding the effects of mindfulness on diabetes, using the PRISM technique. Researchers selected 11 research articles to see Figure 1 depicts the overall procedure for searching articles and filtering related articles.

*Data abstraction*

Narrative tables are used by researchers to compile and summarize selected research. To find findings that are in accordance with the research questions and objectives. Tables and graphs are used to enter the results of the selected studies, namely author, year, research objectives, research design, sample, and research results

*Data analysis/synthesis*

The narrative used by the researcher aims to map, organize and summarize the selected articles. The extracted data is presented by the researcher in table 1.

## RESULTS

The following is a summary of the analysis of 11 articles that focus on the effects of *mindfulness* on diabetes patients (Zarifsanaiey et al., 2020) , (Ellis et al., 2019) (Sasikumar & Padmapriya, 2022) (DiNardo et al., 2022)(Shukla, Gupta, Agarwal, & Bajpai, 2021) (Weng, Liao, Wang, Wang, & Yang, 2022), (Bao, 2022), (Sayadi et al., 2022), (Xia et al., 2022), (Obaya et al., 2023), (Ravari, Mousavi, & Babak, 2020).

**Table 1.** Extraction Data

| Writer | Research title | Objective | Research design | Sample | Research result |
|---|---|---|---|---|---|
| Deborah A. Ellis, Ph.D. April Carcone, Ph.D. Richard Slatcher, Ph.D. Evie NaarKing, Anthony Hains Amy Graham Erica Sibinga s (2019) | Efficacy of Mindfulness-Based Stress Reduction in Emerging Adults with Poorly Controlled, Type 1 Diabetes: | The research objective of this paper is to evaluate the effectiveness of various interventions, such as Mindfulness-Based Stress Reduction (MBSR), Cognitive Behavioral Therapy (CBT), and Diabetes Support (DS), in managing stress, mood, and disease management in young adults with type 1 diabetes. | This research used a quasi-experimental design with a pre-test and post-test design with a randomized control trial | Sample of this research A total of 48 participants were included in this research | The results showed that the Mindfulness-Based Stress Reduction (MBSR) and Cognitive Behavioral Therapy (CBT) interventions significantly improved glycemic control and reduced stress levels in young adults with type 1 diabetes. However, the Diabetes Support (DS) intervention did not show significant changes in glycemic control or stress levels |
| Nahid Zarifsanaiey, Khadijah Jamalian, Leila Bazrafcan4 & Fatemeh Keshavarzy, Hadi Raeisi Shahraki (2019) | The effects of mindfulness training on the level of happiness and blood sugar in diabetes patients | The aim of this study was determine the effect of mindfulness training on happiness levels and blood sugar levels in diabetes patients. | This research used a quasi-experimental design with a randomized control trial | The sample in this study was 13 6 diabetes patients | The results showed that mindfulness training significantly increased levels of happiness and reduced blood glucose levels in the intervention group compared to the control group. |
| Sasikumar S Padmapriya S (2022) | Beneficial effects of mindfulness based stress reduction (MBSR) on biophysiological and psychological parameters among type 2 diabetes | study aimed to demonstrate the potential benefits of MBSR as a non-pharmacological intervention in managing type 2 diabetes. | This research used a true experiment design with a pre-test and post-test design with a randomized control trial | The sample for this study consisted of 78 individuals who met the study inclusion criteria and were willing to participate in the research. | The results showed that MBSR training succeeded in reducing HbA1c scores significantly from before training (8.8 ± 1.3 c ), after training (8.2 ± 1.22) to follow-up (7.9 ± 1.13 ) Apart from that, MBSR training also succeeded in reducing BMI significantly from before training (25.9 ± 3.13), after training (25.7 ± 2.89) to follow-up (25.6 ± 2.79) This study shows that MBSR has positive effects on bio-physiological and psychological parameters of individuals with type 2 diabetes |

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| Monica M DiNardo, Carol Greco, Angela D Phares, Nicole M Beyer, Ada O Youk, D Scott Obrosky, Natalia E Morone, Jason E Owen, Shaddy K Saba, Stephen J Suss, Linda Siminerio (2021) | Effects of an integrated mindfulness intervention for veterans with diabetes distress: a randomized controlled trial | This study aimed to demonstrate the potential benefits of integrating mindfulness interventions into diabetes care, particularly for veterans. | This research used a quasi-experimental design with a randomized control trial | The study involved 132 veterans who were randomly assigned to receive the intervention | The results of this study indicate that the Mind-STRIDE intervention that integrates mindfulness into conventional diabetes care for veterans can help reduce diabetes distress and improve diabetes-related self-care behaviors |
| Rishi Shukla, Manisha Gupta 1, Neha Agarwal Anurag Bajpai (2021 | Mindfulness Meditation as Adjunctive Therapy to Improve the cemic Care and Quality of Life in Patients with Type 1 Diabetes | The aim of this study was to determine the effects of Mindfulness Meditation on glycemic control and quality of life in patients with Type 1 Diabetes. | This research used a quasi-experimental design with a randomized control trial | s study involved a total of 32 adults with Type 1 Diabetes who were randomly selected and divided into an intervention group (meditation) and a control group. | The results showed that Mindfulness Meditation d a positive effect on glycemic control and quality of life in patients with Type 1 Diabetes. After six months, there was a significant mprovement in blood glucose levels and quality of life in the intervention group compared to the control roup. Mindfulness Meditation was found to play an important role in improving glycemic control and quality of life in patients with Type 1 Diabetes |
| Ximei Weng, Shunqi Liao, Fang Wang, Han Wang, Ling Yang (2022) | Evaluation of Mindfulness Training Combined with Aerobic Exercise on Neurological Function Quality of Life in Patients with Peripheral | The aim of this study was to evaluate the effects of mindfulness training combined with aerobic exercise on rological function and quality of life in patients with type 2 diabetic peripheral neuropathy. | This research used a quasi-experimental design with a randomized control trial | This study involved 12 0 patients | The results showed that the combination of mindfulness training with aerobic exercise had a significant therapeutic ef in improving neurological function and quality of life in patients with type 2 diabetic peripheral neuropathy. This combination approach is considered a safe and ective treatment method for type 2 diabetic peripheral neuropathy. |

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| | Neuropathy Type 2 Diabetes Mellitus | | | | |
| Lian Bao (2022) | Intervention Effect of Mindfulness-Based Cognitive Therapy on Diabetes-Related Distress and Self-Care | The aim of this study was to explore the effects of mindfulness-based cognitive therapy (MBCT) on diabetes-related anxiety and self-care abilities in patients with type 2 diabetes mellitus. | Quasi experimental | This study involved 68 patients with type 2 diabetes mellitus who were divided into a control group and an intervention group | The results of this study indicate that mindfulness-based cognitive therapy (MBCT) has a significant effect in alleviating diabetes-related anxiety (DD) in patients with type 2 diabetes mellitus. Patients who received MBCT also showed significant improvements in self-care abilities, especially in terms of pattern eating and exercising. Although the effects of MBCT on self-care abilities did not persist over longer periods of time, this study suggests the need for further research to understand the mechanisms by which MBCT influences patients' self-care abilities and to determine whether MBCT has effects that persist over longer periods of time. . This study provides valuable insight into the potential of MBCT as a beneficial adjunctive intervention for diabetes patients. |
| Ahmad Reza Sayadi, Seyed Hamid Seyed Bagheri, Ali Khodadadi, Reza Jafari Torababadi (2022) | The effect of mindfulness-based stress reduction (MBSR) training on serum cortisol levels, depression, stress, and anxiety in type 2 diabetic older adults during the COVID-19 outbreak | The aim of this study was to examine the impact of a mindfulness-based intervention on levels of stress, anxiety, depression, and serum cortisol levels in older adult patients with diabetes. | This research uses a quasi-experimental design | The sample of this study consisted of 56 older adult patients with diabetes who were systematically selected and divided into an intervention group and a control group, each with 28 members. | This study found that mindfulness training effectively reduced stress, anxiety, depression, and serum cortisol levels in older adults with diabetes. Participants in the intervention group reported improvements in daily functioning and quality of life. Mindfulness training has proven especially helpful during the COVID-19 pandemic. This study highlights the benefits of mindfulness for older adults in managing psychological disorders and stress |

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| Tong Xia, Snehal Lopes, Liwei Chen, Rebecca Roth, Heidi Zinzow, Karyn Jones d , Lingling Zhang, Lu Shi, Meenu Jindal f (2022) | A feasibility study on low-dose mindfulness-based stress reduction intervention among prediabetes and diabetes patients | The aim of this study was to determine the feasibility of delivering a low-dose mindfulness-based stress reduction (MBSR) intervention among prediabetes/diabetes patients, with a focus on participants' positive experiences and improvements in depression, flexibility training, and glycemic control | This study used a qualitative research design with a low dose mindfulness-based stress reduction (MBSR) intervention in prediabetes/diabetes patients | The sample of this research was 19 people | This study shows that a low-dose mindfulness-based stress reduction (MBSR) intervention in prediabetes/diabetes patients is feasible, with positive participant experiences and improvements in depression, flexibility training, and glycemic control<br>The research theme obtained from these quotes is the effectiveness of mindfulness-based interventions, especially mindfulness-based stress reduction (MBSR), in the management of diabetes and prediabetes. The study highlights the feasibility, participant experience, and improvements in depression, flexibility training, and glycemic control as a result of a low-dose MBSR intervention |
| Hany Ezzat Obaya, Heba Ahmed Abdeen, Alae Ahmed Salem, Mai Ali Shehata, Monira I. Aldhahi, Taulant Muka, Elena Marques-Sule, Mona Mohamed Taha, Marwa Gaber, Hady Atef (2023) | Effect of aerobic exercise, slow deep breathing and mindfulness meditation on cortisol and glucose levels in women with type 2 diabetes mellitus: a randomized controlled trial | The aim of this study was to explore the effects of a combination of aerobic exercise with slow deep breathing and *mindfulness* on cortisol and blood glucose levels in women with type 2 diabetes. The study aimed to show that this combination can be beneficial in managing stress and blood glucose levels in individuals with type 2 diabetes. | This study used a quasi-experimental design with a randomized control trial in which participants were randomly divided into two groups: an aerobic exercise group with slow deep breathing and mindfulness, and an aerobic exercise only group. | The number of samples in this study was 58 participants who were divided into two groups, namely the aerobic exercise group with slow deep breathing and mindfulness, and the aerobic exercise group. | The results showed that the combination of aerobic exercise with slow deep breathing and mindfulness meditation significantly reduced cortisol and blood glucose levels compared to the group that did aerobic exercise alone. Compliance with the treatment protocol was high, and both groups showed significant reductions in cortisol and blood glucose levels. |

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| Omid Nikkhah Ravari, Seyedeh Zeinab Mousav , Anahita Babak (2023) | Evaluation of the Effects of 12 Weeks Mindfulness -Based Stress Reduction on Glycemic Control and Mental Health Indices in Women with Diabetes Mellitus Type 2 | The aim of this study was to evaluate the effects of a mindfulness-based intervention on physiological and psychological complications in adults with diabetes. This study also aims to assess the effect of mindfulness training on glycemic control and mental health in patients with type 2 diabetes | This research used a quasi-experimental design with a randomized control trial | This study used a sample of 108 patients, of which 50 patients were in the intervention group and 51 patients were in the control group. The design of this study was a randomized controlled clinical trial | This study shows that a mindfulness-based intervention is effective in reducing physiological and psychological complications in adults with diabetes. The results also showed that mindfulness training could improve mental health and reduce the glycemic control index in patients with type 2 diabetes compared with the control group. The recommendation from this study is that health centers include mindfulness training in routine care for patients with type 2 diabetes. However, this study has limitations in controlling for lifestyle factors such as nutrition and physical activity. In addition, the study results also show that mindfulness meditation can improve glycemic control and mental health in patients with type 2 diabetes, suggesting that mindfulness-based stress reduction can help in managing diabetes and improve mental health in patients with type 2 diabetes |

Synthesis of results from articles analyzed regarding the effects of mindfulness on type 1 diabetes and type 2 diabetes

a. Type 1 diabetes
   1. The effects of the Mindfulness-Based Stress Reduction (MBSR) and Cognitive Behavioral Therapy (CBT) interventions significantly improved glycemic control and reduced stress levels in young adults with type 1 diabetes. However, the Diabetes Support (DS) intervention did not show significant changes in control. glycemic or stress levels (Ellis et al., 2019)
   2. Mindfulness is effective in providing positive effects on glycemic control and quality of life in patients with Type 1 Diabetes. After six months, there was a significant improvement in blood glucose levels and quality of life in the intervention group compared to the control group. Mindfulness Meditation was found to play an important role in improving glycemic control and quality of life in patients with Type 1 Diabetes (Shukla et al., 2021)

b. Type 2 diabetes
   1. The effect of mindfulness MBSR training succeeded in reducing the HbA1c score significantly from before the intervention (Sasikumar & Padmapriya, 2022).
   2. The effect of mindfulness was shown to reduce cortisol and blood glucose levels compared to the group that only did aerobic exercise. Compliance with the treatment protocol was high, and both groups showed significant reductions in blood cortisol and glucose levels (Obaya et al., 2023) .
   3. Mindfulness has an effect that improves neurological function. The combination of aerobic exercise has a significant therapeutic effect in improving neurological function and quality of life in patients with type 2 diabetic peripheral neuropathy (Weng et al., 2022).
   4. Effective mindfulness shows (MBCT) to have a significant effect in alleviating diabetes-related anxiety in patients with type 2 diabetes mellitus. Patients who received MBCT also showed significant improvements in self-care abilities, especially in terms of diet and exercise (Bao, 2022).

## DISCUSSION

Analysis using a scoping review found that mindfulness therapy was able to produce a positive effect on clients with diabetes, which is a holistic approach that provides many benefits in dealing with psychological problems and the patient's health condition (Dalpatadu et al., 2022) . Results from analysis consisting of 11 article(Zarifsanaiey et al., 2020)(Sasikumar & Padmapriya, 2022) (Ellis et al., 2019)(Sohrabi, Sohrabi, Shams-Alizadeh, & Cayoun, 2022) (Sayadi et al., 2022), (Obaya et al., 2023), (DiNardo et al., 2022), (Weng et al., 2022), (Shukla et al., 2021), (Ravari et al., 2020). In the analysis, the results showed that mindfulness had an effect after being intervened in patients with diabetes, providing significant results, namely overcoming hypoglycemia, reducing HBA1C, and providing the effect

of feeling happy, reducing anxiety, reducing cortisol levels, improving neurological function, and being able to improve patient self-care.

This is in line with research conducted by (Osama, Rabea, & Abdelrahman, 2023)mindfulness interventions increase psychological stress and reduce average scores for depression, anxiety and stress. Mindfulness can be one intervention that can help patients manage the stress, anxiety and depression that often accompany medical conditions such as diabetes. Interventions with mindfulness have been proven effective in improving patients' coping skills and reducing levels of stress and depression in diabetes patients (Dalpatadu et al., 2022)

Mindfulness can be used to improve psychological well-being. Individuals who increase mindfulness will result in changes in amygdala activity. Mindfulness can give individuals the ability to be fully aware of what is being experienced at the moment and provide genuine acceptance of that experience (Santoso & Rinaldi, 2022)Mindfulness can be an intervention that can help patients manage stress, anxiety and depression. often accompanies medical conditions such as diabetes. Interventions with mindfulness have been proven effective in improving patients' coping skills and reducing levels of stress and depression in diabetes patients (Dalpatadu et al., 2022). Apart from that, mindfulness can also help patients increase self-awareness and accept the current reality, thereby helping them face the challenges they face daily (Sayadi et al., 2022).

This is in line with research conducted by (Osama et al., 2023) that mindfulness interventions increase psychological stress and reduce average scores for depression, anxiety and stress. Research Results (Jalambadani & Borji, 2019) The MBAT (Mindfulness-Based Art Therapy) intervention had a significant effect on improving quality of life behavior (P <0.05). Among the quality of life dimensions, the highest mean score was obtained in the subpsychological subdomain (18.14 ± 2.35), and the lowest score was obtained in the social relations subdomain (13.54 ± 1.12). The mean (standard deviation) physical and environmental health scores were 17.19 ± 3.55 and 16.10 ± 1.87 respectively.

This research is in line with research by Lengacher et al., 2019. The results showed that the *mindfulness-based stress reduction* (MBSR) program had a significant impact in reducing levels of the stress hormone cortisol in participants who took part in the program. Apart from that, this program also has a positive effect on reducing levels of the pro-inflammatory cytokine hormone interleukin-6 (IL-6). The neurobiological mechanism is related to hormones so that cortisol which causes stress has a negative impact on emotions by increasing the amygdala nucleus and increasing the hypocasmus, so that intervention using *mindfulness* can reduce the amygdala by increasing body awareness and self-regulation by balancing sympathetic and parasympathetic responses and reducing activation of the hypothalamus pituitary adrenal , this increases stress-related autonomic activation, thereby reducing the hormone cortisol (Liu, Cai, Wang, & Zhang, 2023). The decrease in HBA1c in diabetes is related to a decrease in amygdala activation, and provides self-acceptance in order to maintain the condition, because part of mindfulness is self-acceptance of what is experienced (Schanche et al., 2020)

## CONCLUSION

The results of the review show that the effect of *mindfulness* on diabetes mellitus can reduce psychological stress such as stress, depression, and reduce the hormone cortisol, and increase feelings of happiness and reduce blood glucose levels in patients with type 1 diabetes and type 2 diabetes.


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## AUTHOR CONTRIBUTION

Eneng Aminah: designed the study, collected and analyzed articles, and contributed to completion of scoping riview

Meira Erawati: contributed to completion of scoping riview

Meidiana Dwidiyanti: contributed to completion of scoping riview


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