

## A Holistic Approach in the Prevention of Type 2 Diabetes Mellitus: Mini Review of Lifestyle Integration Starting from a Young Age

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### ABSTRACT

*Background: Diabetes mellitus is a significant global health problem with increasing prevalence worldwide. This study aims to analyze the existing evidence regarding the prevention of type 2 diabetes mellitus by integrating lifestyle patterns from a young age. Methods: This study is a literature review research that uses guidelines from PROSPERO with prism flow diagram in selecting articles. The keywords used were "Diabetes Mellitus" OR "Diabetes Mellitus Type 2" AND "Young Age" AND "Lifestyle". Research that discusses the prevention of type 2 diabetes mellitus with a young age lifestyle published between 2023 and 2024 in English and Indonesian. Results: Of the 5 studies analyzed, it was found that effective strategies in preventing type 2 diabetes mellitus, especially at a young age, are a healthy lifestyle, regular exercise, stress management, increasing health literacy and social support from family and environment. Conclusion: prevention of type 2 diabetes mellitus requires a holistic approach that considers various aspects applied from a young age, from early prevention to ongoing management.*

**Keyword:** type 2 diabetes mellitus, lifestyle, prevention, young age

### Introduction

Diabetes mellitus is a significant global health problem with an increasing prevalence worldwide. Indonesia ranks sixth among the top ten countries with the highest number of diabetes cases, totaling 10.7 million in 2019. The prevalence of type 2 diabetes mellitus (T2DM) in Indonesia reached 8.6% of the total population, placing the country fourth in terms of prevalence of this specific type of diabetes. Previous studies have also projected a drastic increase from 8.4 million cases in 2000 to 21.3 million cases in 2030 if not addressed and prevented at an early age (Solfaïne et al., 2024). Prevalence data from the Indonesian Ministry of Health in 2023 shows that the prevalence of T2DM reached 11.7% and continues to show an increase (Kemenkes, 2019).

Type 2 diabetes mellitus is a chronic disease characterized by elevated blood sugar levels in the body due to insulin resistance or inadequate insulin production (Cappellini et al, 2022 ;Gattermann N, et al, 2021). This condition will also affect the way the body uses sugar (glucose) as an energy source. Type 2 diabetes



mellitus is the most common form of diabetes and usually occurs in adults, but recent cases are also in children and adolescents. The causes of T2DM are genetic factors and family history, obesity, unhealthy lifestyle, age and hormonal factors (Arifin et al., 2022). Unhealthy lifestyles, consuming foods high in sugar and fat, lack of physical activity, and smoking are the main factors for people with T2DM at a young age (Carydias et al., 2022).

Youth is an important period in the formation of life habits that will carry over into adulthood. A healthy lifestyle such as maintaining a balanced diet, exercising regularly, and managing stress, plays a huge role in preventing various chronic diseases, including T2DM (Ravi Kant, 2022). Unfortunately, many teenagers and young adults do not realize the importance of this preventive measure. Bad habits that start at a young age are often the initial trigger for metabolic disorders that eventually develop into T2DM. This shows the need for early intervention to educate the public, especially the younger generation, about the importance of a healthy lifestyle. With sufficient knowledge and support from a conducive environment, it is hoped that adolescents can adopt a healthy lifestyle so that the risk of T2DM can be minimized (Kshatri et al., 2024).

This study aims to explore the relationship between the importance of a healthy lifestyle from a young age in preventing T2DM using a literature review by understanding the factors that support the adoption of a healthy lifestyle, this study is expected to contribute to T2DM prevention efforts through targeted health education and promotion.

## **Methods**

### **Type and Literature Review**

This study uses a literature review method. A literature review is a comprehensive summary and critical analysis of existing research on a particular topic. We took the research topic of what lifestyle factors at a young age affect the prevention of type 2 diabetes mellitus based on a literature review.

### **Database, Search engine and Keywords**

The author uses two databases, namely Google Scholar and PubMed using the keywords "Diabetes Mellitus" OR "Diabetes Mellitus Type 2" AND "Young Age" AND "Lifestyle", with the number of articles that have been searched from the database then made a selection based on the inclusion criteria so that these articles are relevant to be obtained and will be grouped according to their criteria to make it easier to conclude.

### **Inclusion and Exclusion Criteria**

The inclusion criteria in this study are articles using Indonesian and English, discussing the prevention of T2DM with a healthy lifestyle starting from a young

age and experimental and observational research designs, while the exclusion criteria are articles in languages other than English and Indonesian, no full text and under 2023 (Table.1).

Tabel. 1 Inclusion and exclusion criteria

Component	Inclusion	Exclusion
Population (P)	Young age, young adolescents both male and female	Infants, elderly
Intervention (I)	Prevention of type 2 diabetes mellitus, especially lifestyle patterns	Treatment and improvement of diabetes mellitus
Comparison (C)	Not taking lifestyle precautions regarding type 2 diabetes mellitus	Not taking lifestyle precautions regarding type 2 diabetes mellitus
Outcome (O)	Normal blood sugar	Uric acid and cholesterol measures
Study design (S)	Quantitative study	Qualitative study, mix method, grey literature

**Study Selection**

Article searches were carried out for one month, namely December 2024, this literature review was carried out by searching for published articles in the database. The article eligibility was assessed from the abstract and title evaluation process. Each article will proceed to the next stage if it meets the inclusion criteria.

**Search Results and Study Selection**

The initial identification search found 4,260 articles, with 1872 duplicates so they were excluded and as many as 2,321 articles entered the next stage. Furthermore, there were 1,121 article titles that were not relevant to the research, and as many as 879 articles were incomplete or did not have full text, and as many as 321 articles did not use Indonesian or English, so as many as 2,321 articles were excluded. A total of 89 articles with fulltext were screened, but 84 articles were excluded on the grounds that 68 articles were not observational and experimental, 10 articles were not the intended intervention, and 10 articles did not discuss the outcome of T2DM prevention. So, in the end there were 5 articles that were successful and suitable for analysis (Figure.1).

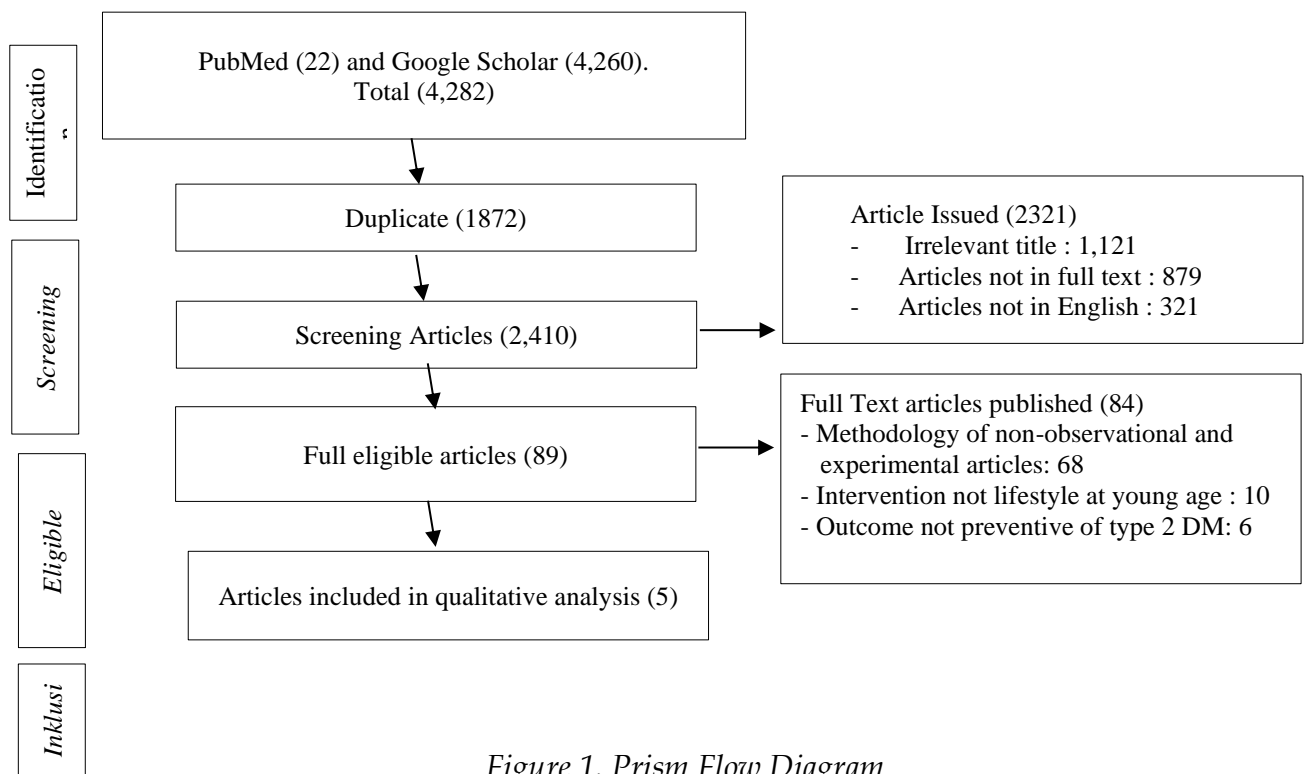


Figure 1. Prism Flow Diagram

<https://jurnal.sinesia.id/index.php/Medical-JKK/index>

### List of Search Result Articles

Tabel 2. *Summary of Research on Holistic Approaches in the Prevention of Type 2 Diabetes Mellitus: Mini Review of Lifestyle Integration Starting from a Young Age*

No	Title	Author (Year)	Objective	Research Design / Respondents	Result and Discussion
1.	Lifestyle Associations of Indonesian Education Students with Type 2 Diabetes Mellitus Disease	Devina Febrianti, et al (2023)	Knowing the description of how much students like sweets and how often students like to do sports.	Quantitative Study	Research on students of Universitas Pendidikan Indonesia shows lifestyle trends that can increase the risk of T2DM. The importance of a healthy lifestyle in preventing T2DM. Health education is also needed to increase awareness of the importance of a healthy lifestyle in preventing T2DM.
2.	Analisis Faktor Risiko Diabetes Pada Remaja Di Indonesia	Nadiya Ulya, dkk (2023)	To analyze the risk factors of diabetes mellitus in adolescents.	Quantitative Study	Risk factors for diabetes in adolescents include the impact of social media-based technology, smoking, family history, gender, knowledge, diet, physical activity, and obesity, with adolescent girls at higher risk.
3.	Management of Diabetes Mellitus in Adolescents: Evaluation of Nutrition Approaches and Nutrition Interventions in a Systematic	Denisa Jauhanita, et al (2024)	To conduct a systematic review of the available evidence on the management of diabetes mellitus in adolescents, with a focus on nutritional approaches and nutrition interventions, and to evaluate the effectiveness of different strategies.	Quantitative Study	Manajemen DMT2 pada remaja It is very important to prevent serious complications, with the right nutritional approach and nutritional interventions playing a crucial role in achieving optimal glycemic control and improving quality of life.



4	Review <i>Burden and predictors of distress among persons with type 2 diabetes mellitus: Excerpts of an observational study from Eastern India</i>	Swastik Mahala, Gandhari Basu, Indranil Halder, (2024)	To assess the prevalence and predictors of Type 2 Diabetes Mellitus among adult diabetics attending tertiary care facilities.	Quantitative Study	The contributing factors of T2DM are young age, low socioeconomic class, lack of physical activity, longer duration of time to reach the hospital, known comorbidities, and poor glycemic control. So the recommendation is that specific and regular counseling sessions coupled with branching strategic services are essential to improve physical as well as mental health.
5	<i>Experimental study on physical exercise in diabetes: pathophysiology and therapeutic effects</i>	Giuseppe Messina, dkk, (2024)	To demonstrate the positive and negative effects of exercise in active diabetics after 3 and 6 months in adolescence	Quantitative Study	The intervention group with physical activity therapy showed lower blood glucose levels than those who did not do physical activity. So the recommendation is that physical activity is an additional therapy used for insulin. In addition, well-managed stress management will reduce cortisol which affects the control of blood glucose levels..

## Results and discussion

Researchers have found 4,260 articles in December 2024 using the keywords “Diabetes Mellitus” OR “Diabetes Mellitus Type 2” AND “Young Age” AND “Lifestyle”. From the articles that have been obtained, researchers selected relevant articles. A holistic approach to T2DM prevention requires the integration of various aspects of a healthy lifestyle starting at a young age. The findings of this study confirm the importance of education, health promotion, and environmental support in shaping lifestyle habits that support long-term metabolic health.

The articles found for analysis were from high-income countries such as Switzerland, low- or middle-income countries (LMIC) such as India and Indonesia, with publication years between 2023-2024. This shows that the findings in this article are still relevant and are in the appropriate and good publication year.

The main focus of the literature review on the prevention of T2DM, first of all, is implementing a healthy diet that is low in sugar and saturated fat and high in fiber and vegetables, doing regular physical activity such as walking, running, or swimming, maintaining body weight to avoid obesity, avoiding bad habits such as drinking alcohol and smoking, regularly undergoing health checks and monitoring blood sugar levels to detect early risk of T2DM. A holistic approach from various aspects of a healthy lifestyle needs to be applied consistently from a young age to provide effectiveness in preventing T2DM.

Diabetes mellitus especially T2DM has become a serious concern in health research in Indonesia, with various studies investigating different aspects of this condition. Based on a review of five recent research articles, several important patterns and findings were found that provide a comprehensive understanding of the current global diabetes mellitus situation especially in Indonesia (Ivanoshchuk et al., 2020). The results showed that an overall approach to the prevention of T2DM requires the integration of various dimensions of a healthy lifestyle that is influenced by physical, mental and social aspects. This approach needs to be done early, because it focuses on preventive efforts at a young age so as to minimize the risk of developing type 2 diabetes mellitus (Mozaffarian et al., 2011).

In an effort to prevent T2DM, several studies recommend a healthy diet. Food intake that is low in sugar, high in fiber and has a rich content of balanced nutrients will help keep blood sugar levels stable, especially at a young age. Dietary intake of plant-based protein significantly reduces the risk of T2DM (Mozaffarian et al., 2011). In addition, light movement and consistent physical activity are further keys in preventing T2DM. A study conducted by Deng et al (2022) showed that adolescents who were physically active by doing gymnastics, physical exercise, and other types of sports had a lower risk of developing T2DM than those who were not in adulthood (Deng et al., 2022). Research conducted by Devina Febrianti et al (2023) showed that there is a tendency for adolescent



lifestyles to increase the risk of T2DM. This study showed that consumption of sugary foods and physical activity patterns among adolescents are risk factors that need attention. These findings are reinforced by other studies, which identified various risk factors for diabetes among Indonesian adolescents. These factors include the impact of social media-based technology, smoking habits, family history, gender, knowledge level, diet, physical activity and obesity (Devina Febrianti Mulyana et al., 2023).

Stress management is something that needs to be considered in preventing T2DM. Continuous stress can trigger an increase in cortisol which affects blood sugar regulation in the body. An intervention or policy on mindfulness has been proven to significantly control the blood sugar content in a person's body. This is important, because in the current era adolescents and adults are the biggest cases of mental illness in Indonesia (Noordali et al., 2017). Another finding is that an increase in good health literacy, for example in the form of education, counseling, dissemination of information both in print and social media can be a real foundation in preventing T2DM. Early education helps individuals understand the importance of healthy habits. Technology-based campaigns, such as health apps and social media, are effective tools to reach adolescents (Naef et al., 2023).

Social support from family, friends and the adolescent's community can influence the success of T2DM prevention. A supportive environment that encourages a healthy lifestyle in the form of healthy food, sports facilities and free time for physical activity plays an important role in shaping these good and healthy habits. Studies have shown that social support can increase the sustainability of lifestyle changes in high-risk groups, especially adolescents (Gyawali et al., 2019). It also showed that the factors that significantly influenced the practice of diabetes prevention were family history, level of knowledge, attitude, and social support from the family. These findings emphasize the importance of a holistic approach in diabetes prevention that involves not only the individual but also the family environment (Kusariana et al., 2021).

The research findings from the analysis of this article reveal several important interventions in the management of T2DM in Indonesia. The importance of a holistic preventive approach, especially among adolescents and young adults, given the increasing risk factors in this age group. The role of family and education in diabetes prevention management is crucial. The implications of these findings lead to recommendations for the development of more comprehensive health education programs, the strengthening of family support systems in T2DM management, and the importance of early intervention, especially in high-risk groups which in this case is the young age group.



## Conclusion

This mini review shows that prevention of T2DM requires a holistic approach that considers various aspects applied from a young age, starting from early prevention to ongoing management, i.e. consistent education, environmental support, and individualized needs-based approaches can provide significant results in preventing the prevalence of T2DM. Further research is needed to evaluate the long-term effectiveness of various interventions, as well as analyze the role of socio-economic factors in T2DM management, especially in Indonesia.

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