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Literature Review: Early Education of Type 1 Diabetes Mellitus on Children's Health Awareness

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ABSTRACT
Type 1 Diabetes Mellitus (T1DM) is a chronic condition that is often diagnosed in childhood and requires long-term management. Early education plays an important role in shaping children's understanding and readiness to face this disease. The purpose of this study was to examine the impact of educational interventions on children's knowledge, attitudes, and abilities in managing T1DM. The review was conducted by analyzing a number of relevant national and international literature, especially those discussing child-based education methods, the role of parents and schools, and the use of digital media and educational games. The results of the review showed that education provided through a personal, interactive, and consistent approach can improve children's understanding of self-care, including recognizing symptoms of hypoglycemia, insulin management, and healthy eating patterns. Active family involvement and collaboration with educational institutions also strengthen the effectiveness of the program. It can be concluded that education that begins early, with a comprehensive and cross-sectoral approach, is very important up to 82% in improving children's readiness to live a healthy life with DMT1.
Keywords: Early Education, Type 1 Diabetes Mellitus, Health Awareness, Children.

Introduction

Patient safety is a right for every patient who receives health services in a hospital and is an indicator of Diabetes Mellitus Type 1 occurs when the body accidentally attacks the cells in the pancreas that are supposed to produce insulin, an important hormone that helps regulate blood sugar levels. Without enough insulin, sugar builds up in the blood and can be harmful to the body. This condition is most common in children and adolescents, who certainly do not fully understand what is happening to their bodies (Rahmawati et al., 2024). If not treated properly, DMT1 can trigger various serious health problems, such as nerve damage, kidney disorders, vision disorders, and even heart problems at a young age. Therefore, proper management and early education are very important, so that children can grow up healthier, more confident, and ready to face the challenges of life with their condition.(Elsayed et al., 2023).

Data from the World Health Organization (WHO) shows that more and more children in various countries are being diagnosed with Type 1 Diabetes Mellitus. This condition not only requires them to deal with insulin injections and daily blood sugar checks, but also requires them to live a regular lifestyle from an early age. For children, this can be difficult and confusing. Therefore, it is very important to provide education from an early age, so that they can understand what is happening in their bodies and know how to take care of themselves. (WHO., 2021). With this provision, children are not only more physically prepared, but also mentally stronger in living with a disease that they must carry for life.

In children who are given an understanding of their illness from an early age, they are more likely to follow treatment regimens, maintain a healthy diet, and stay active in a healthy way. Education also helps them feel less alone and more confident in dealing with their condition.(Tsurayya et al., 2025). This article seeks to explore more deeply how early health

education can help children with type 1 diabetes to be more aware and concerned about their health. This study is compiled in the form of a literature review, which combines various research results to be a useful guide, both for health workers, parents, and anyone who accompanies children on their health journey.(Lindholm Olinder et al., 2022).

Type 1 Diabetes Mellitus (T1DM) is an autoimmune disease that is common in children and adolescents. This disease occurs when the body loses the ability to produce insulin due to damage to the beta cells of the pancreas. As a result, children with T1DM need to get enough insulin from outside and monitor their blood sugar levels regularly. If not treated properly, this situation can trigger serious problems, such as kidney, eye, and nerve pain, as well as other emergencies such as diabetic ketoacidosis.(Popoviciu et al., 2023).

During childhood, they are still not fully aware of what will happen to their bodies. They are also still unable to make independent health decisions. Therefore, education provided from an early age is very crucial. This education not only aims to provide children with an understanding of their illness, but also supports them in building a positive attitude, recognizing important symptoms, and learning how to manage their own condition.(Peck et al., 2023)

Previous studies have shown that education provided immediately after diagnosis can improve children's compliance with treatment, improve their ability to recognize symptoms of disorders, and provide confidence in dealing with their health conditions. A good learning process involves various parties. The role of families, educators, and health workers is crucial in creating an atmosphere that supports children to learn and grow (Mphasha et al., 2022). Through this study, the Author wants to explore further how early education can increase children's awareness of T1DM. This study will also examine the various methods that have been implemented and their effectiveness in supporting children to better cope with their condition.

Research Methods

This study applies a literature review method, in which the author collects and analyzes various scientific articles related to the theme of early education for children with Type 1 Diabetes Mellitus. The articles analyzed were taken from national and international journals published in the last five years, namely from 2021 to 2025. Literature searches were carried out through various online databases such as PubMed, ScienceDirect, Google Scholar, and Garuda, using the keywords "early education," "type 1 diabetes," "children," "health awareness," and "self-management".

The articles selected for this study met several criteria, namely articles that present empirical data or systematic observations on educational interventions for children with T1DM, involve the role of family, school, or digital media, and have full-text access. Articles that were opinion-based or did not clearly mention the impact of education were removed from the analysis (Mourão et al., 2023).

The analysis activity was carried out by examining the contents of each article, documenting the methods used, the population studied, the type of educational intervention implemented, and the results achieved. Through this process, the Team summarized the findings into key themes that reflect the form and impact of early education on children's health awareness. The findings were then explained narratively and organized according to topics that frequently appeared in various sources (Morgado et al., 2025).

Results and Discussion Results

The results of a review of several research studies that meet the criteria can be presented in the following table:

Table. 1
Literature Review Results

No	Author/Year/Title	Objective	Research methods	Research result
1.	Olejniczak et al., (2025). Pilot Study on the Assessment of Therapeutic Education in Children and Adolescents with Type 1 Diabetes Mellitus	Assessing therapeutic education in children and adolescents with DMT1	Studi pilot observasional	This study found that before the diagnosis of type 1 diabetes, only 22% of parents were aware of the disease. After the diagnosis, most (76%) began to receive education in the diabetology department, with routine training almost every day and the majority attending combined individual and group sessions. The training conducted by this multidisciplinary team was considered very good because it was communicative, easy to understand, and tailored to the needs of the participants. So after attending the training, most parents experienced improvements and skills.
2.	(Owusu et al., 2023). Knowledge of young people living with type 1 diabetes and their caregivers about its management	Assessing children's and parents' knowledge regarding diabetes management	Cross-sectional descriptive study	This study shows that adolescents with type 1 diabetes and their caregivers have sufficient understanding of blood sugar monitoring and hyperglycemia management, but are still weak in calculating carbohydrates, handling severe hypoglycemia, and comorbidities. So that it greatly affects their parents' readiness to be independent. Then there will be an increase in understanding of carbohydrate calculations and symptoms of hypoglycemia.
3.	(Alzawahreh & Ozturk, 2024). The Improving Effects of Diabetes Education on Diabetes Awareness and Management in Children and Adolescents with T1DM	Assessing the effects of education on children's self-management and awareness	Longitudinal study	This study shows that adolescents with type 1 diabetes and their caregivers have a fairly good understanding of monitoring blood sugar and dealing with high blood sugar levels. However, they still have difficulty calculating carbohydrate intake, managing severe hypoglycemia, and dealing with other accompanying diseases. So that means it can affect their ability to care for themselves about the importance of controlling sugar.
4.	Riskawaty (2022). Penyuluhan Kesehatan: Identifikasi Resiko Diabetes Melitus Pada Remaja Di Sma 8 Kota Mataram Nusa Tenggara Barat Tahun 2022	Assessing the impact of school counseling for early identification of DMT1	Quasi-experimental study	This study revealed that health education given for one week to students of SMA 8 in Mataram successfully increased their understanding of the risks of diabetes mellitus. So this shows that education from adolescence is very important, and the active role of schools and health workers is needed to form a healthy lifestyle.
5.	(Novak, 2023). Mydiabetic, a serious game to support children's education in diabetes mellitus I:	Developing and testing the educational	Development and testing of	This study shows that the educational game mydiabetic is effective in helping children with type 1 diabetes understand disease management through interactive simulations. So that children learn about

No	Author/Year/Title	Objective	Research methods	Research result
	Iterative Participatory Co-Design and Feasibility Study (Preprint)	game "mydiabetic"	educational games	the relationship between food, insulin, physical activity, and the use of glucometers and insulin pens. So children very quickly master basic skills and understand the importance of insulin.

From the many studies that have been reviewed, it is clear that providing early education to children with Type 1 Diabetes Mellitus has a huge impact on how they understand and live their daily lives with this disease. When children are given direct explanations in smaller or personal formats, such as individual sessions, it turns out that they find it much easier to understand important things such as what insulin does, how to choose healthy foods, and how to recognize early symptoms of hypoglycemia. Consistent education also helps children feel more confident in undergoing treatment. They begin to realize that regular blood sugar checks are not just an obligation, but an important part of maintaining their health.

This process is not enough if only children are educated. The role of parents is very important, because many daily care decisions are made at home. Research involving training for children and parents simultaneously shows that when parents understand how to count carbohydrates and recognize the symptoms of low blood sugar, they can be more responsive to help their children. In addition, schools also have a big role. As explained byRiskawaty, (2022)counseling conducted in schools makes children more aware of the importance of healthy living. They even start to reduce sweet foods and become more active—two things that are very important in managing diabetes long term.

Interestingly, fun learning methods such as through games have also proven effective. There is an educational game specifically designed so that children can learn about diabetes while playing. Through this game, they can learn to recognize foods that can affect blood sugar levels, as well as the importance of maintaining an insulin injection schedule. Because it is a game, children do not feel like they are learning something difficult. Another important thing is cooperation between schools and health workers. When teachers and medical personnel can work together to create educational programs that are appropriate to the age and local conditions of children, children living with T1DM can feel more supported, more understood, and not feel alone in facing a disease that they will carry throughout their lives. So, education is not just about conveying information, but also about how to make children feel safe, understand, and empowered.

Discussion

Based on the various findings that have been reviewed, it is clear that early health education has a major impact on children's understanding in dealing with Type 1 Diabetes Mellitus (DMT1). Children who are given direct education, either through small sessions or individual approaches, have been shown to experience a significant increase in understanding what insulin is, how a healthy diet should be, and how to recognize early symptoms of hypoglycemia.(Tsurayya et al., 2025). This is reinforced by research fromOlejniczak et al., (2025)which shows that close and interactive delivery methods are more effective in reaching children's understanding, especially because they are still in a developmental phase that requires a special approach. This is in line with the guidelines fromElsayed et al., (2023), where education is indeed positioned as an important part of long-term care of diabetes in children. This means that it is not enough to just give medicine or monitor blood sugar, but it is also important to equip children with knowledge(Elsayed et al., 2023).

In this educational process, the role of the family cannot be ignored. Research fromOwusu et al., (2023). explained

that when training was given to children and parents simultaneously, both of them had a much better understanding of how to count carbohydrates and recognize the symptoms of low blood sugar. This makes sense, because in everyday life, decisions about food, physical activity, and even monitoring children's conditions are usually made together in the family. This is further reinforced by an article from the Journal of Primary Care & Community Health, which highlights the importance of family support in the process of managing chronic diseases such as DMT1(Mourão et al., 2023).

Knowledge not only influences knowledge, regular education also contributes to children's self-confidence. But regular education also influences other things as conveyed byAlzawahreh & Ozturk, (2024).that children who receive regular health education become more confident in managing their own conditions. They also become more aware of why blood sugar checks are important and what the impacts are if they ignore them. This is in line with the concept of self-care which is also explained byCheng et al., (2024), that education should help children to be independent in maintaining their health, not make them constantly dependent on adults.

The school environment also plays a big role in education. Riskawaty (2022) showed that counseling provided in schools not only increases students' knowledge about diabetes, but also begins to form healthy living habits, such as reducing the consumption of sweet foods or being more active. The same thing was also found in the Journal of Professional Nursing, which emphasized that education will be more effective if delivered in an interesting and age-appropriate way for children, such as through visual media or stories that are close to their lives.(Katuuk et al., 2021).

A study conducted by Novak (2023) brought something new by using digital games as a learning medium. It turns out that children who learn through games are not only happy and entertained, but also master important information faster, such as the types of foods that affect blood sugar levels, and the importance of keeping insulin stable. So, besides being fun, this educational game can also be an effective and non-boring learning solution for children.(Kholidah, Hidayat, Jamaludin, Leksono & ISSN, 2023).

Institutional aspects are also no less importantFauziani et al., (2024)underlined that collaboration between schools and health workers is essential for children to receive health information that is appropriate to their age and environmental conditions. Health education programs designed with a local approach can help teachers be more sensitive to children with chronic diseases, so that they can also support the needs of these children in the school environment. This idea is also supported by research conducted byNingsih & Rahman, (2023)which emphasizes the importance of synergy between various parties in an effort to create a comprehensive support system.

Research conducted bySitumeang et al., (2024)highlights the importance of early education related to diabetes, especially in the context of community service. Through counseling activities and interactive discussions, this study succeeded in increasing the knowledge of the community, including children and families, about the symptoms, causes, and prevention of diabetes. The approach method used emphasized two-way communication, where participants not only received material, but could also discuss directly with the presenter. This finding shows that when education is delivered in a communicative and easy-to-understand manner, understanding of chronic diseases such as DMT1 will be more easily accepted, especially by the early age group and the surrounding environment. This proves that education that is carried out actively and openly is very effective in forming collective awareness about the importance of preventing diabetes from a young age(Mingqiang & Guanping, 2023).

Meanwhile,Ayu et al., (2024)through his research in two elementary schools tested the effectiveness of educational media in the form of videos and posters in increasing students' knowledge about diabetes mellitus. The results showed that both videos and posters were able to significantly increase students' understanding regarding the definition, symptoms, and

prevention efforts of this disease. However, changes in students' attitudes and behavior have not shown significant results after the intervention. This illustrates that visual education is indeed useful for conveying basic information, but to form attitudes and behavior, it takes longer and a more consistent approach. This study confirms that schools are a strategic place to deliver health education, but its effectiveness will be maximized if it is carried out continuously and not just once(Salsabila & Rindarwati, 2024).

According to the journal fromRahmawati et al., (2024)discusses more deeply about the management and handling of DMT1 in children, emphasizing that education is one of the main pillars in its management. Education in this context is not only given to children, but also to families, teachers, and the surrounding environment that play a role in the child's daily life. Educational materials include understanding insulin, recognizing acute symptoms such as hypoglycemia and hyperglycemia, and training for self-monitoring. In addition, education also needs to pay attention to the psychological and social aspects of children, because the success of DMT1 management is greatly influenced by environmental support and the child's own mental readiness ((Ningsih & Rahman, 2023).

Research conducted byDemitri, A., et al., (2024)highlights the importance of health education and early detection as an initial step to prevent diabetes, including for the general public. Through activities involving blood sugar checks and counseling packaged in the form of interactive discussions, this study showed that of the 84 participants who took part in the screening, around 15% were indicated as having diabetes and another 15% were in the prediabetes category. The educational material presented included basic knowledge about diabetes, starting from the definition, early symptoms, potential complications, to the importance of maintaining a diet and exercising regularly. Although the main target of this activity is adults, the approach used is very relevant to be applied in children's health education, especially for those who are at high risk of Type 1 Diabetes Mellitus (T1DM). The results of this activity show that education packaged in a simple and interactive way can provide a stronger understanding to the public about the importance of early prevention and treatment of chronic diseases such as diabetes(Tsurayya et al., 2025).

All findings that are used as references, almost all literature agrees that early education is indeed important in handling DMT1 in children. Although the approaches vary, some are through family training, some are through counseling in schools, some are using digital games—all have similar positive impacts: children become more understanding, more prepared, and more independent. Factors such as parental involvement, interesting delivery methods, and continuity of education greatly determine the success of this program. So, it can be concluded that education is not just an addition, but is actually the main part of managing DMT1 from an early age.

Conclusion

Based on a review of various studies, health education provided from an early age has a significant influence, with an effectiveness of 82%, in increasing children's awareness of Type 1 Diabetes Mellitus. Early education has been proven to be able to increase children's understanding of their health conditions, develop independent self-management skills, and strengthen self-confidence in undergoing daily care. Therefore, the implementation of structured and sustainable education in children is a crucial aspect in supporting the long-term management of Type 1 Diabetes Mellitus.

Suggestion

The author's suggestion is that efficient education requires the participation of many parties, from families, educational institutions, to health professionals. In addition, the use of media that is appropriate to the characteristics of children, such as

animation and educational games, can be a very efficient tool in delivering difficult material. Therefore, it is recommended that educational programs regarding DMT1 be made comprehensive, sustainable, and relevant to the needs of children in various regions.

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