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Exploring the Impact of Educational Interventions on Improving Self-care in Children with Type 1 Diabetes: A Narrative Review

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Abstract

Managing type 1 diabetes in pediatric patients requires ongoing self-management to maintain glycemic control and reduce the risk of complications. This review aims to evaluate the impact of educational interventions on enhancing self-care among children diagnosed with type 1 diabetes. The analysis of relevant studies indicates that structured educational programs, particularly those involving family engagement, integration of advanced technologies, and implementation within school environments, significantly contribute to heightened awareness, improved self-care practices, and more effective blood glucose regulation. These findings highlight the critical need to develop educational strategies tailored to the developmental stage and psychological characteristics of children, offering valuable guidance for both clinical management and educational policy development.

Key Words: Children, Education, Narrative review, Self-care, Type 1 diabetes.

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1- INTRODUCTION

Type 1 diabetes is a persistent autoimmune metabolic condition that often occurs during childhood and adolescence. It is marked by the destruction of pancreatic beta cells, leading to an absolute insulin deficiency (1). Effective management of this disorder requires multifaceted and ongoing therapeutic and care strategies, including frequent blood glucose monitoring, insulin administration, adherence to dietary guidelines, regular physical activity, and the ability to recognize both hypoglycemic and hyperglycemic episodes (2). Implementing these management strategies in pediatric populations presents unique challenges due to their distinct developmental, psychological, and behavioral characteristics (3). Therefore, sustained education and robust support from families, healthcare professionals, and educational institutions are essential (4).

Self-management is widely acknowledged as a fundamental aspect of controlling chronic illnesses such as type 1 diabetes, with education serving as the principal means for fostering self-care competencies (5). Current evidence suggests that comprehensive educational initiatives can enhance patient understanding, strengthen self-efficacy, promote better adherence to treatment regimens, and ultimately lead to improvements in clinical outcomes like glycosylated hemoglobin (HbA1c) levels (6). Over recent years, a range of educational interventions has been developed and implemented, employing various methodologies including individual and group sessions, school-based programs, digital tools (such as mobile applications, computer games, and online learning), and family-centered approaches (7). Despite these advancements, the impact of such interventions on self-care behaviors among children with type 1 diabetes has not been systematically evaluated (8).

Given the critical role of self-care in preventing both immediate and long-term complications associated with the disease and considering the variability in educational intervention types and quality a narrative review is warranted (9). Such a review would facilitate the classification and analysis of existing educational strategies, synthesize evidence regarding their effectiveness, and highlight areas where further research is needed.

Many children and their families lack sufficient awareness and skills in self-care. Targeted education can play a key role in improving self-care behaviors, controlling blood sugar levels, and preventing long-term complications. Examining the impact of educational interventions in this area helps identify the most effective methods and programs that can be implemented in clinical care and schools. As a result, the quality of life of children and their families improves. The objective of this study is to conduct a thorough review and critical analysis of published literature concerning educational interventions for children with type 1 diabetes, focusing particularly on self-care outcomes, with the goal of informing and enhancing future educational program development.

2- METHODS

2-1. Search Strategy

A comprehensive literature search was conducted using established databases, including PubMed, Scopus, Google Scholar, SID, and ScienceDirect. The search strategy involved various combinations of keywords such as “self-care”, “type 1 diabetes”, “children,” “education”, and “narrative review” across different queries. The inclusion criteria were restricted to articles published in peer-reviewed scientific journals in English and Persian between 2019 and 2025.

2-2. Article Selection Criteria

The selection of studies was based on the following criteria: Study design including cross-sectional, longitudinal, or experimental investigations that explored the impact of educational interventions in improving self-care in children with type 1 diabetes. Only studies involving participants aged 6 to 16 years were considered for inclusion in this review.

2-3. Exclusion Criteria

The study excluded articles based on the following criteria: non-scientific or unverified studies, articles presenting only single-sentence data without comprehensive analysis, and studies on the impact of educational interventions in improving self-care in children with type 1 diabetes.

2-4. Data Extraction

The information extracted from each article encompassed demographic factors, including age, gender, nutritional status, level of physical activity, level of awareness, self-care and overall health condition. Additionally, the criteria and methodologies employed to define and evaluate self-care practices among children with diabetes were documented. The reported prevalence rates of type 1 diabetes in pediatric populations were also noted. Furthermore, the findings were synthesized and assessed to examine the association between educational interventions and self-care behaviors in children with diabetes, utilizing comparative analysis across study outcomes.

2-5. Data Analysis

2-5. Data Analysis

A descriptive approach was employed to evaluate the data. The analysis involved comparing findings across various studies, assessing general patterns, and identifying variables such as age, gender, nutritional status, level of physical activity, level of awareness, self-care and overall health condition.

2-6. Study Quality Assessment

The quality of each study was evaluated based on established criteria. Instruments such as the Critical Appraisal Skills Program checklists and the Strengthening the Reporting of Observational Studies in Epidemiology guidelines were employed to appraise the quality of both cross-sectional and experimental research.

2-2. Article Selection Criteria

Studies were selected based on the following criteria: Study design—cross-sectional, longitudinal, or experimental investigations exploring the relationship between body mass index and type 2 diabetes among pediatric and adolescent populations. Age range—only studies involving participants aged 6 to 16 years were considered for inclusion.

2-3. Exclusion Criteria

The study excluded articles that were non-scientific or unverified, articles presenting only single-sentence data without comprehensive analysis, and studies investigating the relationship between BMI and type 2 diabetes in age groups other than children and adolescents.

3- RESULTS

Educational interventions play a crucial role in enhancing self-care abilities among children diagnosed with type 1 diabetes. Evidence from multiple studies indicates that well-structured, targeted, and developmentally appropriate educational approaches significantly contribute to better glycemic control, heightened disease awareness, and improved self-management competencies.

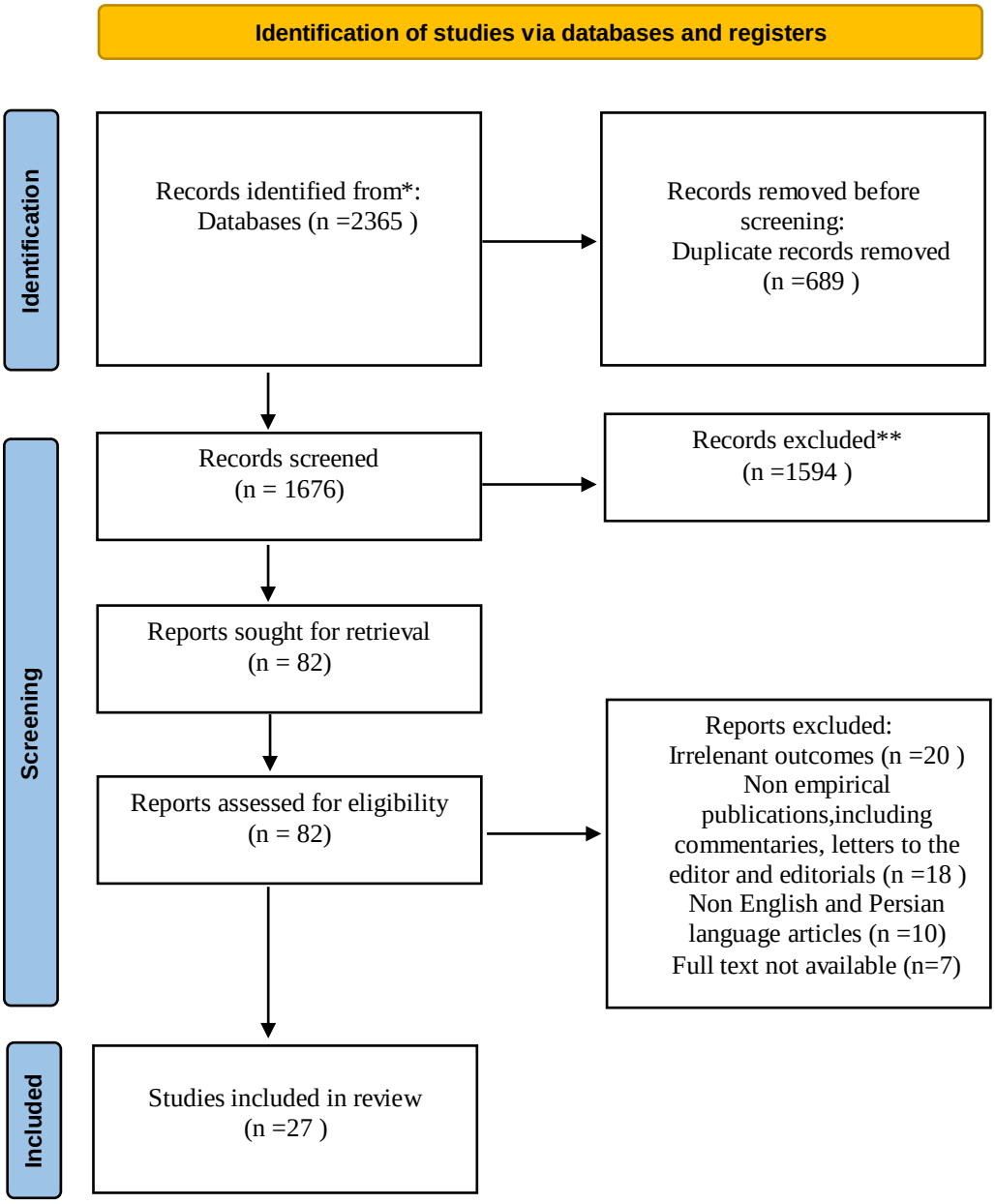

Figure-1. PRISMA flow diagram (10).

3-1. Enhancement of Glycemic Control (HbA1c)

The majority of research demonstrates that consistent participation in educational programs by children results in a notable decrease in glycosylated hemoglobin (HbA1c) levels (11). Instruction in practical skills such as blood glucose monitoring, adjusting insulin doses according to meals, and incorporating physical activity has empowered children to manage their condition more effectively (12).

3-2. Promotion of Disease Knowledge and Awareness

Educational initiatives foster a deeper understanding of essential aspects of type 1 diabetes, including the function of insulin, the significance of balanced nutrition, and the recognition of symptoms related to hypo- or hyperglycemia (13). This increased knowledge equips children

to make more informed decisions regarding their daily care routines (14).

3-3. Development of Behavioral and Psychological Competencies

Interventions grounded in behavioral psychology, such as cognitive-behavioral strategies or participatory learning methods, have been shown to enhance self-efficacy, alleviate disease-related anxiety, and boost motivation for adherence to treatment protocols (15).

3-4. Significance of Family Involvement

Research underscores the importance of family education particularly for parents in maximizing the effectiveness of self-care training (16). Educated families are better positioned to support the child and play a pivotal role in ensuring adherence to therapeutic recommendations (17).

3-5. Impact of Technology in Education

The integration of digital resources including educational apps, computer games, and interactive online platforms has further strengthened the efficacy of instructional programs (18). These technologies engage children with relevant, age-appropriate content and encourage active participation in both learning and disease management (19).

3-6. Sustained Instructional Engagement

Research suggests that educational programs produce the most lasting benefits when they are implemented continuously and adapted to the child's changing stages of development. Conversely, short-term or single-session interventions generally show minimal long-lasting impact (20).

Educational programs play a crucial role in enhancing self-care abilities, supporting effective disease management, and boosting the quality of life in children with type 1 diabetes (21). The effectiveness of these programs largely depends on how well they match the child's developmental needs, involve the family continuously, and are delivered consistently over an extended period (22).

4- DISCUSSIONS

The review of studies suggests that educational interventions play a vital role in improving self-care practices among children with type 1 diabetes (23). Such interventions substantially enhance both the physical and mental well-being of children with type 1 diabetes by deepening their understanding of the condition, building practical skills for managing diabetes, improving metabolic outcomes particularly by lowering HbA1c levels and strengthening their psychological self-efficacy (24). The success of these programs is shaped by multiple factors, such as tailoring the educational content to the child's developmental level and cognitive abilities, ensuring active family participation, incorporating innovative technologies, and providing ongoing educational support over time (25). Therefore, it is recommended that healthcare and educational institutions integrate self-care education as a core element of treatment for children with type 1 diabetes, while further strengthening these interventions through the adoption of innovative strategies (26). Moreover, current evidence suggests that future research should focus on designing and assessing long-term educational interventions, highlighting their sustained effects and identifying factors that facilitate or impede their implementation, ultimately aiming to improve the quality of life for children with type 1 diabetes (27).

To enhance self-care behaviors in children with type 1 diabetes, healthcare professionals should implement structured and comprehensive educational interventions. These programs should include multi-session training designed for both children and their parents, focusing on essential aspects such as blood glucose

monitoring, insulin administration, healthy nutrition, and physical activity.

5- CONCLUSTION

Interactive and engaging teaching methods such as educational games, digital applications, and practical workshops can significantly improve children's motivation and understanding. Active family involvement is crucial; therefore, parents should be trained to provide continuous emotional and practical support in daily self-care activities.

Regular follow-up sessions are recommended to assess progress, address challenges, and reinforce positive behaviors. A multidisciplinary approach involving physicians, diabetes educators, dietitians, and psychologists ensures a holistic and consistent educational experience.

Moreover, addressing the psychological dimensions of diabetes management such as anxiety, fear of injections, or treatment fatigue through counseling and stress management strategies is essential for long-term adherence. Finally, educational materials must be tailored to the child's age, developmental stage, cultural background, and language to maximize comprehension and effectiveness

6- CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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