Review Paper

Nursing and Family-centered Care and Quality of Life in Children With Diabetic Kidney Disease: A Systematic Review

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ABSTRACT

Background: Recent academic work highlights that combining nursing-based interventions with a family-centered care philosophy can markedly elevate the overall wellbeing of children with diabetic kidney disease (DKD). These care models prioritize developing children's capacity for effective self-management, supporting their emotional and social adjustment, and strengthening general health through active collaboration between families and the healthcare team.

Objectives: The purpose of this systematic review is to analyze the scientific literature to determine how nursing strategies and family-centered care practices influence quality-of-life outcomes for pediatric patients experiencing diabetic kidney complications

Methods: A comprehensive search across multiple databases initially identified 1000 studies. After removing duplicates and screening titles and abstracts, 50 articles were reviewed in full; 7 studies met the inclusion criteria and covered research from January 2010 to March 2025. These studies focused on the psychosocial experiences of parents of children undergoing complex medical treatments. Two reviewers independently conducted study selection and data extraction. The methodological quality was assessed using the Cochrane risk-of-bias tool, the Newcastle–Ottawa scale, and the critical appraisal skills programme (CASP) checklist. Findings from qualitative and quantitative studies were integrated through interpretive thematic synthesis.

Results: Studies consistently reported that family-centered care improves multiple domains of children's wellbeing, including physical functioning, psychological health, and social interaction. Nursing interventions contributed to stabilizing fluid and electrolyte status, ensuring adequate nutritional intake and developmental progress, preventing clinical complications, and providing ongoing emotional and educational support to both children and their caregivers.

Conclusions: Evidence suggests that nursing approaches grounded in family participation significantly enhance the quality of life (QoL) of children coping with DKD. Such care models not only strengthen physiological health but also foster emotional stability and broader psychosocial resilience in young patients facing long-term medical conditions.

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Introduction

Diabetic kidney disease (DKD) in children is a severe and progressive condition that disrupts the body's water and electrolyte balance, leading to a gradual decline in kidney function over three months or more as shown in Figure 1 [1]. This condition typically necessitates long-term clinical care in both hospital and community settings. DKD is associated with various complications that require nursing interventions and family-centered care in inpatient and outpatient environments [2]. Given the progressive nature of the disease and the complexity of treatment protocols, nurses and families need to be actively involved in acute and preventive care strategies and in coordinating these efforts [3].

Additionally, the need for multiple treatments can be distressing for patients and their families, highlighting the critical role of nurses in educating and involving them in decision-making regarding treatment plans [4, 5]. Research indicates that approximately 26.3 million people worldwide suffer from DKD. Furthermore, data show an increasing prevalence of this disease among children, with current estimates indicating that 18 out of every 1000000 children worldwide are affected [6]. This condition significantly affects the quality of life (QoL) of affected children and their families. Children with diabetes who experience episodes of diabetic ketoacidosis (DKA) or hyperglycemia without ketoacidosis are at risk for acute kidney injury (AKI), which is characterized by volume depletion as reflected in adjusted sodium concentrations [7].

AKI during DKA is worsened by stress and inflammatory responses. Repeated instances of poor blood sugar control and DKA heighten the risk of developing DKD in children [8]. The progression involves significant alterations in the structure of various parts of the kidney, starting with the thickening of the capillary basement membrane and changes in the tubules. Additional glomerular changes may include loss of endothelial cells and matrix proliferation [9]. The longer a child has diabetes, the higher the likelihood of developing DKD. A concerning aspect of pediatric DKA is the high rate of AKI, which is linked to poorer outcomes and may result in permanent kidney damage [10]. Impact of factors involved in the onset and progression of DKD [11].

Children may exhibit symptoms such as swelling around the eyes or ankles due to fluid retention, fatigue from anemia or toxin buildup, increased frequency or urgency of nighttime urination, and elevated blood pressure. These symptoms are crucial indicators of deteriorating kidney function and require immediate medical attention [11]. Diagnosis typically involves a combination of urine tests to detect protein and blood tests to evaluate kidney function, using indicators such as serum creatinine levels and estimated glomerular filtration rate [12]. Regular monitoring is vital for early detection and prompt intervention. Managing diabetic kidney failure in children necessitates a comprehensive approach that combines specialized nursing care with family-centered support, addressing the physical, psychological, and social aspects of the disease [13]. Nurses and families play a critical role in recognizing signs and symptoms, managing treatments, and ensuring patient safety. Overall,

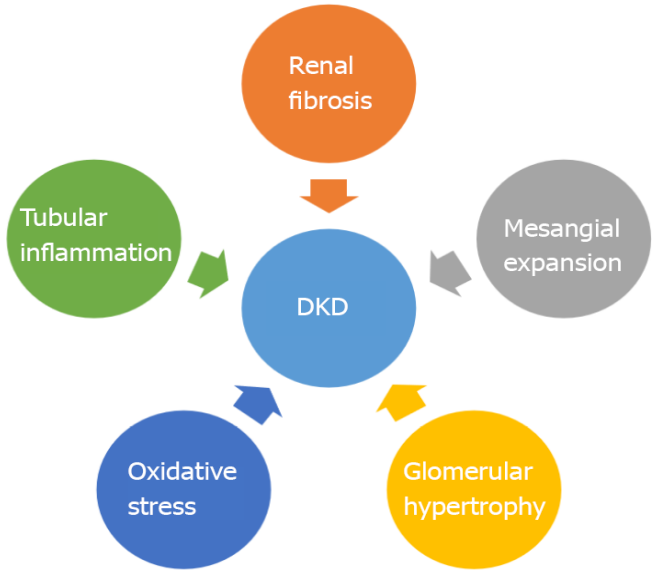

Figure 1. Pathogenesis in DKD [4]

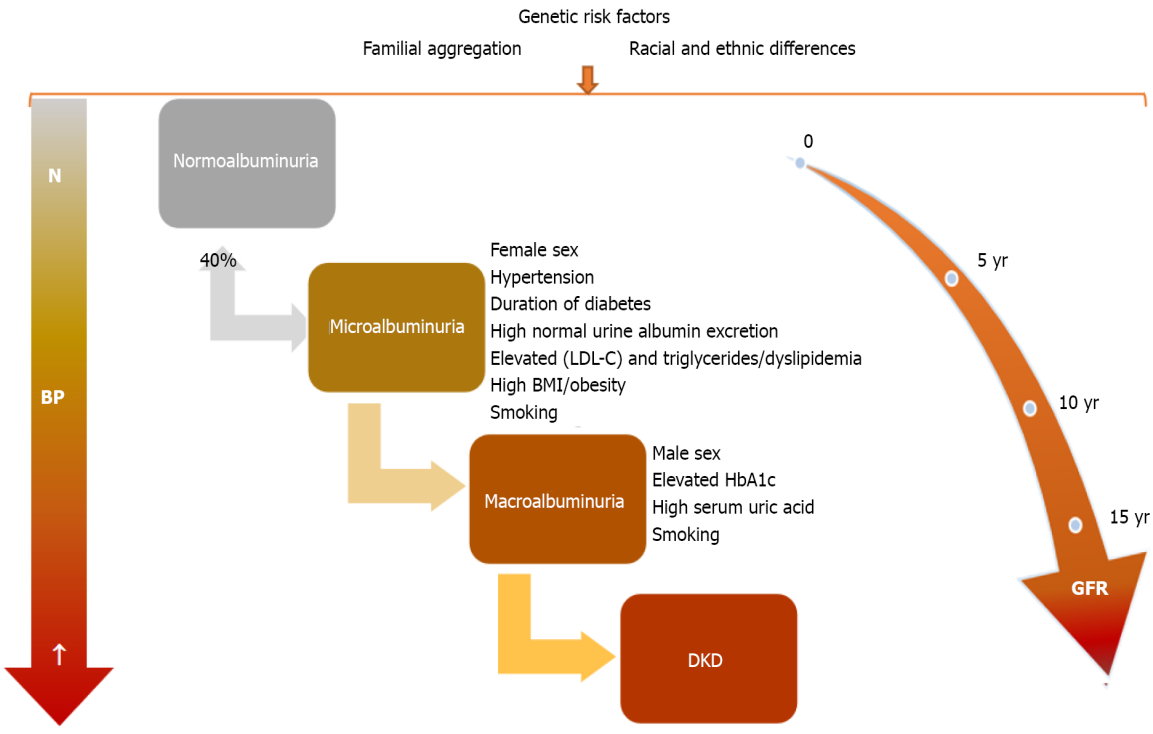

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Figure 2. Changes in DKD: Progression of blood pressure, decline in glomerular filtration rate, and albuminuria levels [14]

effective nursing interventions and family-centered care can significantly improve various aspects of the QoL for children with diabetic kidney failure, particularly in psychological and physical areas as shown in Figure 2 [14].

Materials and Methods

An extensive search of several academic databases initially retrieved 1000 records. After duplicates were removed and titles and abstracts were thoroughly screened, 50 articles were retained for full-text assessment. Of these, 7 studies met the predefined inclusion criteria and were published between January 2010 and March 2025.

Data sources

The literature search was conducted systematically across 5 major databases: PubMed, Scopus, Web of Science, Google Scholar, and Scientific Information Database (SID). These sources were chosen for their comprehensive coverage and reliability in the fields of medicine, health sciences, and social sciences.

Search strategy

The search employed a combination of predefined terms: ("Child"[MeSH] OR "adolescent"[MeSH] OR "pediatrics"[MeSH]) AND ("diabetic nephropathies"[MeSH] OR "kidney diseases"[MeSH] OR "renal insufficiency"[MeSH]) AND ("nursing care"[MeSH] OR "family-centered care"[MeSH] OR "patient care team"[MeSH] OR "health education"[MeSH] OR "self care"[MeSH]) AND ("quality of life"[MeSH] OR "health-related quality of life"[MeSH] OR "patient satisfaction"[MeSH]).

Eligibility criteria

Studies were eligible if they examined the effects of nursing and family-centered care interventions on the QoL of children with DKD. Broader studies addressing related outcomes were also included if they offered insights relevant to the pediatric population.

Study design

Both qualitative and quantitative research designs were considered. Acceptable study types included randomized and non-randomized trials, observational studies, systematic reviews, and case reports.

Time frame and language

Only studies published in English or Persian between January 2010 and March 2025 were included.

Exclusion criteria

Publications without original data or lacking a clearly defined methodological framework, such as commentaries, editorials, or letters, were excluded unless they provided empirically verifiable evidence. Studies in languages other than English or Persian, or those with insufficient reporting of outcomes, were also omitted.

Data extraction and management

Two reviewers independently extracted study data using a structured form. Information collected included authorship, publication year, study design, sample size, study setting, and detailed descriptions of nursing and family-centered care interventions, including frequency and duration. Data were initially recorded in Google Sheets and later imported into EndNote for duplicate removal and reference management.

Quality appraisal

To account for the variety of study designs, validated tools suitable for each methodology were applied. Randomized controlled trials were assessed using the Cochrane risk-of-bias 2 tool; observational studies were assessed using the Newcastle–Ottawa scale; and qualitative studies were assessed using the critical appraisal skills programme (CASP) checklist. Discrepancies between reviewers were resolved through discussion. No study was excluded solely on the basis of risk of bias; however, quality assessments informed the narrative synthesis, and findings from studies rated as moderate or high risk were interpreted with caution. Further details are presented in Table 1.

Data analysis

A thematic synthesis approach was used to integrate findings across studies. Following Braun and Clarke's 6-step framework (familiarization, coding, theme identification, review, definition, and reporting), two reviewers independently conducted inductive coding. Any disagreements were resolved through discussion or consultation with a third reviewer, allowing recurring patterns to be organized into coherent thematic categories.

Limitations

Several limitations were identified: 1) high heterogeneity in study designs, sample sizes, and outcome measures prevented meta-analytic synthesis; 2) methodological quality varied, with some studies showing moderate to high risk of bias; 3) geographical and resource limitations affected the generalizability of certain interventions; and 4) few studies addressed parental psychosocial challenges, highlighting the need for further targeted research in this area.

Results

Seven studies met the inclusion criteria and were included in this review following a thorough and systematic screening process. The initial search retrieved a large number of records evaluating the effects of nursing and family-centered care interventions on the QoL of children with DKD. The selection process is illustrated in Figure 1, which presents a PRISMA-compliant flowchart in Figure 3, showing the number of records identified, screened, assessed for eligibility, and ultimately included, along with the reasons for exclusion at each stage. This table summarizes the key features of the seven included studies and presents the thematic categories identified during the synthesis.

Family-centered care interventions for improving the QoL of children with DKD

Parental involvement is crucial in managing a child with DKD. The concept of family-centered care, which emphasizes the family's integral role in managing children's chronic illnesses, is gaining traction. This model treats the family as an essential collaborator in the child's treatment plan. Fundamental to this approach are principles such as mutual respect, open communication, collaborative decision-making, and the empowerment of parents [21].

The significance of family-centered care becomes particularly apparent in conditions like DKD, where the management is intricate, prolonged, and expensive, especially when it progresses to kidney failure in children. In such contexts, family-centered care enhances the following aspects (Figure 4) [22, 23].

1) It boosts the family's knowledge and ability to manage the illness; 2) It strengthens the engagement between parents and healthcare providers; 3) It amplifies family involvement in making treatment decisions. It elevates the overall wellbeing of both the child and the family.

Discussion

AKI frequently occurs in children with DKA, although it is usually transient. The severity of this condition is associated with prolonged intensive care unit stays and extended periods required to correct the acidosis [24].

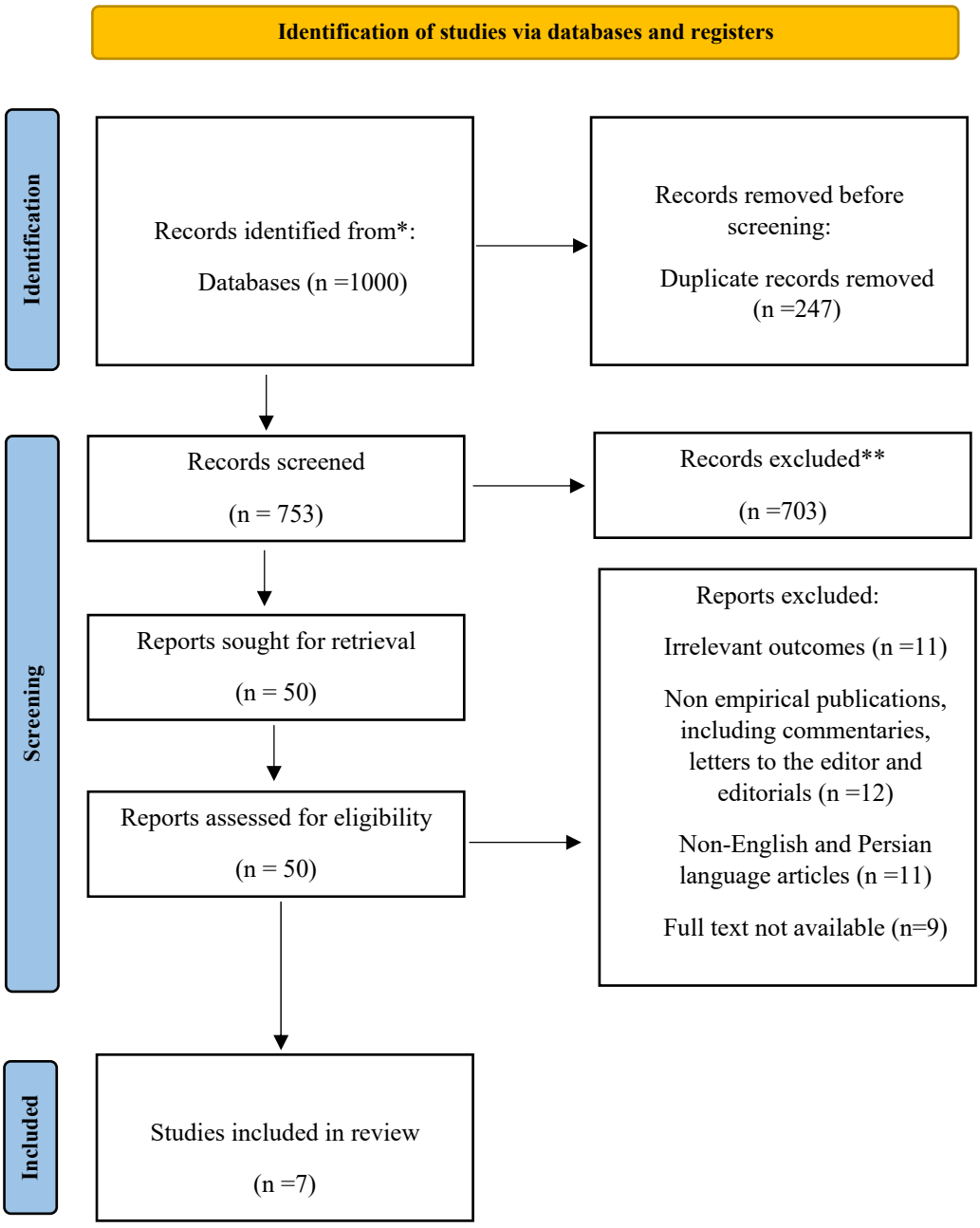

Figure 3. PRISMA flow diagram

Certain factors, such as male sex and reduced serum bicarbonate levels, have been associated with an elevated risk of AKI [25]. Among children with type 1 diabetes, DKA accounts for approximately 64% of AKI cases, and it is linked to adverse outcomes, including increased hospitalization rates, higher mortality, and progression to chronic kidney disease [26].

Bergmann et al. (2024) reported a notably high frequency of AKI in children and adolescents hospitalized for DKA [27]. Although Garcia et al. did not conduct longitudinal follow-up, their findings indicated that 42% of AKI episodes persisted at follow-up [28]. In contrast, Hegab et al. observed that while most AKI cases were mild, they generally did not result in prolonged hospital stays or sustained renal dysfunction. Nonetheless, two patients progressed to end-stage renal disease after 14 years, at ages 22 and 23 [29].

Diabetes mellitus exerts a profound effect on renal and urinary function, with diabetic nephropathy recognized as the leading cause of end-stage kidney disease in children.

Table 1. Characteristics and thematic classification of included studies

Author(s), Year	Study Type	Sampling Method	Participants	Intervention	Conclusion
Soltysiak et al. 2022 [15]	Retrospective	Convenience	50	The study involved 197 adolescents with diabetes. A retrospective review of the data indicated	AKI and poor blood sugar control, characterized by repeated episodes of ketoacidosis, can increase the risk of progression to DKD
Lopez et al. 2022 [16]	Review	Review of literature	N/A	Review and analysis of previous research	Focus on finding new treatment options for children with chronic kidney disease by conducting rigorous clinical trials
Hursh et al. 2017 [17]	Review study	Review of literature	N/A	Paper and electronic records were reviewed. All the analyses were conducted in SAS/STAT software, version 9.4	Better understanding of the risk factors and long-term consequences of AKI, especially as children are at risk for diabetic nephropathy
Huang et al. 2020 [18]	Retrospective	Convenience	50	Both paper-based and electronic medical records spanning the years 2000 to 2017 were reviewed, and all statistical analyses were conducted using SAS/STAT software, version 9.4.	Clinical markers indicated volume depletion, which correlated with the severity of AKI.
Bjornstad et al. 2018 [19]	Observational prospective cohort study	Randomized	699	The study included 532 participants and was a multicenter, randomized clinical trial.	Lower insulin sensitivity was associated with a risk of hyperfiltration over time, leading to DKA.
Evin et al. 2024 [6]	Cross-sectional	Convenience	150	Cross-sectional study in pediatric endocrinology on children under 18 years of age	Identifying demographic and genetic risk factors among participants associated with the occurrence of DKA
Myers et al. 2020 [20]	Cohort study	Convenience	120	A secondary analysis was conducted using data from pediatric emergency care applied research networks that investigated DKA.	The findings indicated that AKI is more likely to develop in children experiencing more severe acidosis and reduced circulating blood volume during episodes of DKA.

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Patients experiencing stage 2 or 3 AKI exhibited slower resolution of metabolic acidosis due to impaired renal filtration; however, roughly 80% recovered from acidosis within the first day of treatment. Clinical indicators of fluid loss were strongly correlated with AKI severity [30]. Nursing professionals need to recognize that AKI is a common complication of DKA in pediatric populations and carries a risk of permanent kidney damage. Evidence suggests that both nursing interventions and family-centered care strategies can play a crucial role in improving the QoL for children living with DKD [31].

The findings from the reviewed studies indicate that nursing and family-centered care approaches effectively address the multifaceted challenges faced by children with DKD, enhancing their physical, psychological, and social wellbeing [32]. Nursing interventions focus on maintaining fluid and electrolyte balance, supporting adequate nutrition and growth, preventing complications, and offering both educational and emotional guidance to children and their families [33]. Key nursing interventions for managing DKD involve dietary planning, insulin administration, and lifestyle modification. Pharmacological approaches, including angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers, are commonly employed to protect kidney function by controlling blood pressure and minimizing proteinuria. For patients who progress to end-stage renal disease, renal replacement therapies such as dialysis or kidney transplantation may be required [34].

Proactive nursing care, when integrated with a family-centered approach, is essential for the management of pediatric DKD. Guidelines promoting healthy lifestyle behaviors, including balanced nutrition and regular exercise, play a key role in minimizing disease-related complications [35]. Although the condition presents substantial challenges for affected children and their families, early detection, coupled with comprehensive nursing interventions, has been shown to improve clinical outcomes significantly [36]. By fostering a collaborative environment among mul-

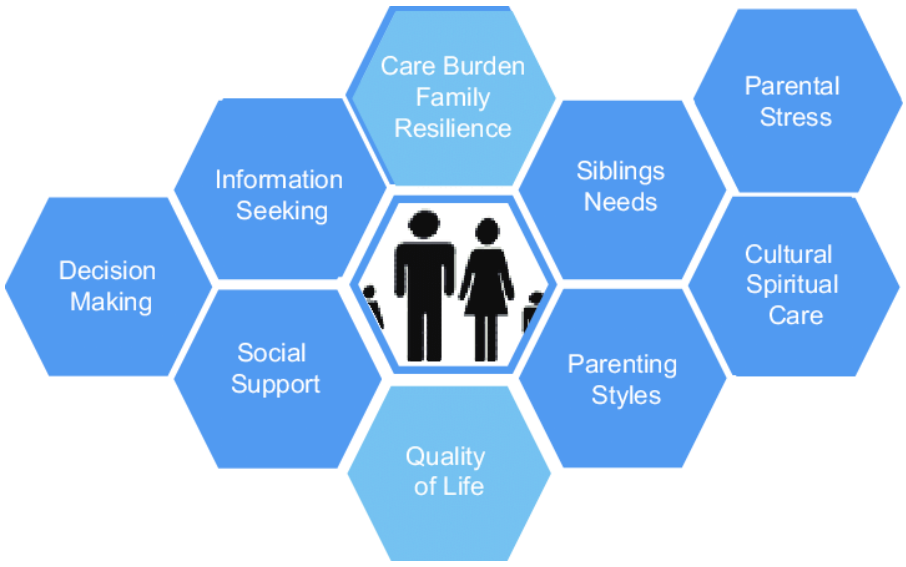

Figure 4. Common concepts in family-centered care [24]

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tidisciplinary healthcare providers and encouraging active family engagement, these strategies help mitigate disease risks and enhance the overall QoL for children living with diabetes [37].

Conclusion

Research shows that family-centered nursing and caregiving interventions significantly enhance the QoL for children with DKD. These approaches not only support improvements in physical health but also promote emotional wellbeing and overall QoL for children living with chronic conditions. In addition, these approaches profoundly affect children's emotional, educational, social, and lifestyle aspects. A supportive family environment plays a critical role in building resilience among these children, facilitating effective management of their condition, and improving their overall QoL. Conversely, dysfunctional family dynamics can create barriers that exacerbate the challenges these children face.

Study limitations

This review was limited to studies published in English and Persian, potentially excluding relevant and high-quality research.

Ethical Considerations

Compliance with ethical guidelines

The review was conducted following PRISMA guidelines, and its protocol was registered with PROSPERO (Code: CRD420251022114) and the Research Registry (UIN: reviewregistry1971). The authors adhered to ethical standards, including avoiding plagiarism, data fabrication, and duplicate publication.

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Authors contributions

Conceptualization, investigation, and writing: All authors; Methodology and formal analysis: Jalal Nourmohammadi and Mojtaba Lotfi; Data curation: Jalal Nourmohammadi, Mojtaba Lotfi and Mehrnaz Nazari Rad; Project administration: Jalal Nourmohammadi; Resources and visualization: Jalal Nourmohammadi and Mehrnaz Nazari Rad; Software: Jalal Nourmohammadi and Mojtaba Lotfi; Validation: Jalal Nourmohammadi and Mojtaba Lotfi; Supervision: Jalal Nourmohammadi and Fereshteh Ghaljaei.

Conflicts of interest

The authors declared no conflict of interest.

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