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Early Introduction of Sugar in Childhood and Its Association with the Development of Chronic Diseases: A Literature Review

Introdução precoce de açúcar na infância e sua associação com o desenvolvimento de doenças crônicas: uma revisão de literatura

Introducción Temprana del Azúcar en la Infancia y su Asociación con el Desarrollo de Enfermedades Crónicas: Una Revisión de la Literatura

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Abstract:
Introduction: Complementary feeding is a fundamental period for the formation of eating habits, corresponding to the stage when children begin to be exposed to different flavors, textures, and types of foods, usually from six months of age onward. However, the early introduction of sugars and ultra-processed foods may promote the development of inadequate dietary patterns, contributing to a greater acceptance of foods with low nutritional value and the rejection of natural foods. This scenario may increase the risk of developing chronic diseases, such as overweight and childhood obesity. According to the World Health Organization (WHO), approximately 7% of children under five years of age are overweight, and 3% are already living with obesity. Objective: To analyze the factors associated with the early introduction of sugar into the diet during the first two years of life, as well as its impact on the development of chronic diseases. Methodology: This study is a literature review. Articles published between 2022 and 2026 that addressed the early introduction of sugar in infant feeding and its risks for the development of chronic diseases were included. The search was conducted in the databases National Library of Medicine (PubMed) and Scientific Electronic Library Online (SciELO). Results and Discussion: The analyzed studies demonstrated that the early introduction of sugar into infant feeding remains frequent, mainly through the consumption of sugar-sweetened beverages and ultra-processed foods. Evidence showed an association between excessive sugar intake during the first years of life and overweight, childhood obesity, and the development of chronic diseases. Furthermore, early exposure to sugar contributed to the establishment of unhealthy eating habits. Conclusion: The analyzed studies showed that the consumption of sugar-sweetened beverages and ultra-processed foods can negatively affect health, increasing the risk of overweight and the development of chronic diseases. Therefore, it is essential to strengthen public policies and actions aimed at promoting healthy eating during childhood.

Keywords:
Infant feeding; Children; Chronic diseases; Sugar; Ultra-processed foods.

Resumo:
Introdução: A introdução alimentar configura-se como um período fundamental para a formação dos hábitos alimentares, correspondendo a fase em que crianças passam a ter contato com diferentes sabores, texturas, e tipos de alimentos, geralmente a partir dos seis meses de idade. Entretanto, a oferta precoce de açúcares e produtos ultraprocessados pode favorecer a formação de padrões alimentares inadequados, contribuindo para uma maior aceitação de alimentos com baixo valor nutricional e uma rejeição de alimentos in natura. Esse cenário pode acarretar aumento do risco para os desenvolvimentos de doenças crônicas, como sobrepeso e obesidade infantil. De acordo com organização Mundial da Saúde, cerca de 7% das crianças

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menores de cinco anos estar com sobrepeso e 3% já possuem obesidade. Objetivo: Analisar, os fatores associados à introdução precoce de açúcar na alimentação nos primeiros dois anos de vida, bem como seus impactos no desenvolvimento de doenças crônicas. Metodologia: Trata-se de uma revisão de literatura. Foram incluídos artigos publicados em 2022 e 2026, que abordassem a introdução precoce de açúcar na alimentação infantil e os riscos para desenvolvimento de doenças crônicas. A busca dos estudos foi realizada nas bases de dados National Library of Medicine (PubMed) e Scientific Electronic Library Online (SciELO). Resultados e Discussões: Os estudos analisados demostraram que a introdução precoce de açúcar na alimentação infantil permanece frequentemente, principalmente por meio de consumo de bebidas açucaradas e alimentos ultraprocessados. Evidenciando associação entre o consumo excessivo de açúcares nos primeiros anos de vida e o excesso de peso, obesidade infantil, e desenvolvimento de doenças crônicas. Além disso, observou-se que essa exposição precoce contribuía para a formação de hábitos alimentares inadequados. Conclusão: Os estudos analisados mostraram que o consumo de bebidas açucaradas e alimentos ultraprocessados pode causar prejuízos a saúde, como maiores riscos de excesso de peso e desenvolvimento de doenças crônicas. Dessa forma destaca-se a importância de fortalecer políticas públicas e ações voltadas a promoção da alimentação saudável na infância.

Palavras-chave:
Alimentação infantil; Crianças; Doenças crônicas; Açúcar; Alimentos ultraprocessados.

Resumen:
La alimentación complementaria constituye un período fundamental para la formación de los hábitos alimentarios, correspondiendo a la etapa en la que los niños comienzan a tener contacto con diferentes sabores, texturas y tipos de alimentos, generalmente a partir de los seis meses de edad. Sin embargo, la introducción temprana de azúcares y productos ultraprocesados puede favorecer la formación de patrones alimentarios inadecuados, contribuyendo a una mayor aceptación de alimentos con bajo valor nutricional y al rechazo de alimentos naturales. Este escenario puede aumentar el riesgo de desarrollar enfermedades crónicas, como el sobrepeso y la obesidad infantil. Según la Organización Mundial de la Salud, aproximadamente el 7% de los niños menores de cinco años presentan sobrepeso y el 3% ya padecen obesidad. Objetivo: Analizar los factores asociados a la introducción temprana del azúcar en la alimentación durante los dos primeros años de vida, así como sus impactos en el desarrollo de enfermedades crónicas. Metodología: Se trata de una revisión de la literatura. Se incluyeron artículos publicados entre 2022 y 2026 que abordaran la introducción temprana del azúcar en la alimentación infantil y los riesgos para el desarrollo de enfermedades crónicas. La búsqueda se realizó en las bases de datos National Library of Medicine (PubMed) y Scientific Electronic Library Online (SciELO). Resultados y discusión: Los estudios analizados demostraron que la introducción temprana del azúcar en la alimentación infantil sigue siendo frecuente, principalmente mediante el consumo de bebidas azucaradas y alimentos ultraprocesados. Se evidenció una asociación entre el consumo excesivo de azúcares en los primeros años de vida y el exceso de peso, la obesidad infantil y el desarrollo de enfermedades crónicas. Además, se observó que esta exposición temprana contribuía a la formación de hábitos alimentarios inadecuados. Conclusión: Los estudios analizados mostraron que el consumo de bebidas azucaradas y alimentos ultraprocesados puede causar perjuicios a la salud, como un mayor riesgo de exceso de peso y desarrollo de enfermedades crónicas. Por lo tanto, se destaca la importancia de fortalecer las políticas públicas y las acciones dirigidas a la promoción de una alimentación saludable en la infancia.

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Palabras clave:
Alimentación infantil; Niños; Enfermedades crónicas; Azúcar; Alimentos ultraprocesados.

INTRODUCTION

According to Rossi and Poltronieri (2024), In the book "Treatise on Nutrition and Diet Therapy," nutrition in the first years of life has a direct influence on the development of human potential, and its inadequacy can result in nutritional disorders with lasting repercussions. In this sense, adopting proper eating habits from childhood is fundamental for promoting health and preventing illnesses throughout life (Rossi; Poltronieri, 2024).

In this context, the introduction of solid foods is an essential milestone in the formation of eating habits, corresponding to the period in which the child begins to have contact with different flavors, textures, and types of food, generally from six months of age (BRAZIL, 2019). The Ministry of Health, through the document Food Guide for Children Under 2 Years Old (2019), emphasizes that this phase is crucial for the development of eating behavior, influencing future preferences and choices.

According to the Dietary Guidelines for Children Under 2 Years Old (2019), the early introduction of foods high in sugar and ultra-processed products can promote the development of inadequate eating patterns, characterized by greater acceptance of foods with low nutritional value and rejection of *whole foods* , such as fruits, vegetables, and legumes. This scenario is associated with an increased risk of Non-Communicable Chronic Diseases (NCDs), which constitute a group of permanent diseases characterized by causing disability in individuals and promoting pathological changes, requiring a long period of follow-up and rehabilitation (BRAZIL, 2022). Among these diseases, obesity, type 2 Diabetes Mellitus (DM2), and cardiovascular diseases stand out, reinforcing the relevance of strategies aimed at promoting healthy eating from the first years of life (BRAZIL, 2019).

The phase corresponding to the first two years of life, within the early childhood period, constitutes a critical moment for child growth and development, and is also crucial for the formation of taste and eating habits (BRASIL, 2019). In this context, the World Health Organization (WHO) defines an infant as a child under two years of age, fed exclusively or supplemented with breast milk (Rossi; Poltronieri 2024).

According to the Dietary Guidelines for Brazilian Children Under 2 Years Old (2019), a document that guides appropriate dietary practices in early childhood, it suggests that Offering

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healthy foods from childhood increases the likelihood that the child will become more aware and autonomous regarding their food choices throughout life.

A study conducted by Silva and Santana (2024) analyzed food consumption markers in children aged 6 to 24 months. A study conducted through the Food and Nutritional Surveillance System (SISVAN) in the municipality of Palmas, Tocantins, with a sample of 1,118 children, revealed a high frequency of consumption of ultra-processed foods (33.29%), sweetened beverages (27.17%), instant noodles and savory biscuits (20.21%), as well as sweets (18.25%). These findings indicate that the recommendations of the Ministry of Health, which advise against offering sugars to this age group, are not yet widely followed (BRASIL, 2019).

Globally, data from the National Study of Infant Feeding and Nutrition (ENANI) indicate a growing trend in Non-Communicable Chronic Diseases (NCDs), with approximately 7% of children under five years of age being overweight and 3% already obese, reinforcing the magnitude of the problem and the need for early interventions (BRAZIL, 2022).

The early introduction of sugar into children's diets occurs mainly through the consumption of ultra-processed foods and the offering of sugary drinks, frequently introduced in the first years of life due to their convenience and high sensory acceptance. Furthermore, family and cultural practices, such as offering sweets as a form of treat or reward, contribute to this process (BRAZIL, 2019). With all this early exposure, the formation of preferences for sweet flavors is favored, which can lead to less acceptance of *whole foods* and the adoption of inadequate dietary patterns, resulting in an increased risk of developing NCDs throughout life (BRAZIL, 2019).

Despite WHO recommendations regarding the reduction of free sugar consumption for children under two years of age, The early introduction of sugar into children's diets persists as a recurring practice, highlighting the need for further investigation into its health impacts (BRASIL, 2019). In this context, scientific evidence demonstrates that the consumption of ultra-processed foods is associated with the development of chronic non-communicable diseases, such as type 2 diabetes mellitus, obesity, and cardiovascular diseases (Louzada, M. et *al.* 2021).

According to the document National Strategies for the Prevention and Care of Childhood Obesity - Protect, published by the Ministry of Health (2022), in 2020, among children monitored in Primary Health Care (PHC), 15.9% of children under 5 years old and 31.8% of children aged 5 to 9 years were overweight, which contributes to overloading the health system, with expenses reaching R$ 3.45 billion in 2018, with 11% allocated to the treatment of obesity.

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Given this problem, the importance of analysis from a public health perspective is highlighted, since the early introduction of sugar in childhood is associated with an increase in chronic non-communicable diseases, such as obesity, diabetes, and hypertension, directly impacting the health of the population (BRAZIL, 2019).

The role of the nutritionist is fundamental through actions of food and nutritional education, guidance to families and caregivers, encouragement of breastfeeding and proper introduction of food, in addition to promoting strategies that reduce the consumption of ultra-processed foods, contributing to the prevention of health problems and the formation of healthy eating habits throughout life (BRAZIL, 2021).

Given this reality, the present study aims to analyze, Based on evidence available in the literature, the factors associated with the early introduction of sugar into the diet during the first two years of life are: life, as well as its impacts on the development of chronic diseases.

METHODOLOGY

This study consists of an integrative literature review, of a descriptive-exploratory nature. Its objective is to answer the following guiding question: "How can the early introduction of sugar into infants' diets, especially in the first two years of life, influence..." in the development of chronic diseases throughout life?

The bibliographic search was conducted in the following databases: National Library of Medicine (PubMed) and Scientific The search process was constructed using terms related to infant nutrition, sugar consumption, ultra-processed foods, and chronic diseases, combined using Boolean operators (AND, OR). The following terms were used in English : Infant Feeding ; Children ; Sugar; Ultra-Processed Foods and Chronic Diseases .

Primary studies published between 2022 and 2026, available in Portuguese, English, or Spanish, that addressed the early introduction of sugar in childhood and its association with the development of chronic diseases, especially in the context of public health, were included. Duplicate studies, monographs, literature reviews, editorials, opinions, dissertations, event abstracts, as well as those that did not present a relationship with the early introduction of sugar in children's diets, its impacts on health, or its association with the development of chronic diseases were excluded.

Data collection was carried out sequentially. Initially, studies were searched in the selected databases using the defined descriptors. Next, titles and abstracts were read to select articles that met the inclusion criteria. Finally, the full texts were read, allowing for the

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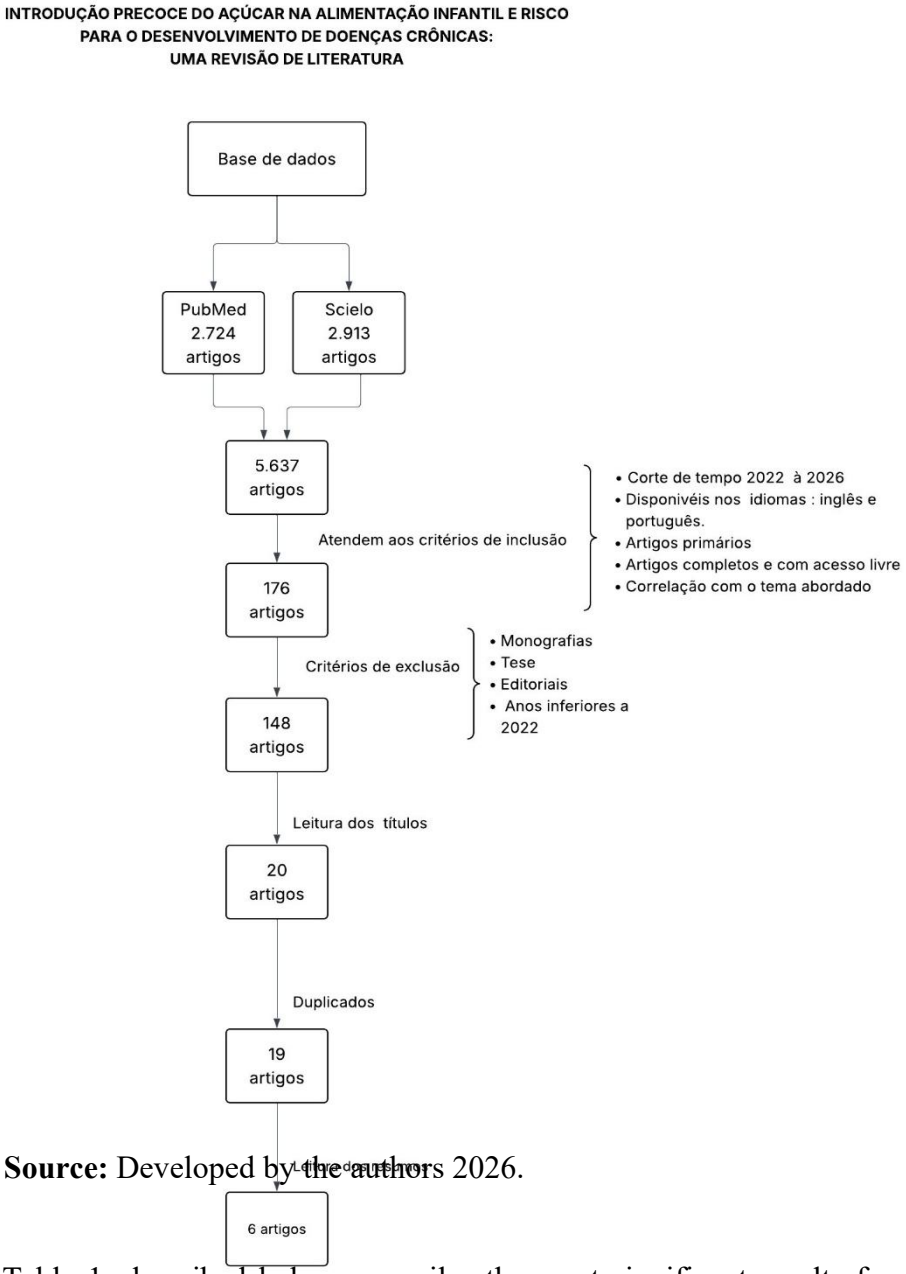
identification of key evidence regarding the early introduction of sugar into infant diets and the risks for the development of chronic diseases.

Figure 1 - Flowchart of the selection of articles chosen for the current research.



Source: Developed by the authors 2026.

Table 1, described below, compiles the most significant results from each scientific article selected in the research, as well as authors, type of study, year of publication, study location, sample, objectives, methodology, and results. The 6 articles are primary studies, published in national and international journals, and conducted in Brazil, Australia, France, China, and the United States.

Of the selected articles, all were published in English.

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Table 1. Summary of articles analyzed for review.

Articles	Author, year of publication, place of study	Delineamento, type of study and N	Study objectives	Methodology	Key findings
1	Barratto, P. *et al*.; 2025 Harbor Happy	Study of cohort nested in a randomized field trial o. Performed in Health Centers Primary; N= 715 mother pairs children	Identify the period Critical of excessive weight gain in childhood and the dietary patterns associated with it.	Study of follow-up of mother pairs Children from gestation up to 6 years of age. Data collection took place at 6, 12 months, 3 and 6 years, through interviews and assessments of patterns Dietary guidelines and nutritional status. The sample includes 715 pregnant women and their children, attended at primary health care centers.	The study identified that high food consumption Ultra-processed foods are linked to increased overweight and obesity, a situation exacerbated by excessive weight gain between 6 and 12 months of age, associated with the use of baby bottles, juices, and sweetened beverages.
2	Franco, T. *et al*. 2024 Municipality of Saint Paul.	Retrospective observational study. N = 31 children under 2 years old with feeding difficulties.	Describe the intake of foods containing sugar for children children under 2 years old with food difficulties.	The study was conducted at the Center of Excellence in Nutrition and Difficulties Nutritional disorders, with children aged 12 to 24 months. For data collection, the following was used: Inventory The Food Intake Scale (FI) is a clinically used instrument to assess children's food consumption patterns, including foods accepted, refused, and those that are not accepted.	The study The study revealed early sugar consumption in children under 2 years old, with 77.4% having already consumed sugar. food or Sugary drinks, with a predominance of products such as cookies, brownies, cakes, and pies, indicating a low-calorie diet. nutritional quality.

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				which ones not They demonstrate preferences.	
3	Kay, M. *et al* 2023 States United	Study of longitudinal cohort; conducted in 4 residential clinics pediatric attention primary; N = 406 children aged 2 to 24 months.	Assess whether the intake of 100% fruit juice before 6 months of age is associated with increased consumption of juices and -sweetened drinks at 24 months and whether this happens because sociodemographic factors Africans .	Longitudinal study based on data from the control arm of the program. Greenlight . The questionnaires The questionnaires were administered by research assistants, in English or Spanish, either in person at the clinic or by telephone. Inclusion criteria considered... participants registered in the program and with complete data on fruit juice consumption, 100% in the 2, 4, 6, and 24-month check-ups.	Children exposed to juice at an early age showed higher intake of this beverage throughout the follow-up period, suggesting that this early introduction contributed to their food preferences and... Sugary drinks.
4	Backer, P. *et al.* 2023 Municipality of Porte Happy.	Study longitudinal, carried out in three hospitals public; N = 400 mother-child pairs in the postpartum period.	Impact of introduction early juices in breastfeeding before 6 months of age in anthropometric parameters co and consumption of sweet foods and Sugary drinks in preschool children .	The study was conducted in two parts: first, through a questionnaire about juice consumption; and second, through a questionnaire about general maternal, child, and socioeconomic information. The child's weight and height were also measured.	Offering juices before 6 months of age was associated with increased consumption of sweet drinks and foods in preschool, and this exposure also altered future food consumption and preferences. Furthermore, an increase in the prevalence of overweight and obesity was observed between the first and second phases of the study, rising from 5.8% to [percentage missing in original text]. 26.2%.

5	Dharod , J. *et al.* 2025	Study of longitudinal investigation, carried out in	Estimate average daily sugar intake	This study was conducted through data collection via interviews.	The high intake of added sugar in formulas and
	States United	pediatric clinics. N= 234 participant s.	added to formulas and complementary foods.	telephone calls in the first 24 hours of life and at 6, 9, and 12 months. including 24-hour dietary recalls (multiple methods) passages – NDRS). They were Maternal sociodemographic information (age, education, income, race/ethnicity) and maternal BMI data were collected. Infants older than 18 years were included, and infants with conditions that interfered with feeding were excluded.	complementary foods, It was associated with a higher risk of overweight in early childhood. This exposure influenced dietary patterns and the risk of future chronic diseases.
6	Reis, R. *et al.* ; 2022 municipality in the interior of São Paulo Paul.	Study transversal; N = 599 children aged 6 to 24 months.	Analyze the prevalence of sugar consumption.	The study was conducted with individuals receiving care at primary family health units during well-child visits, with data collected through interviews. The data consisted of children under follow-up care. outpatient study, with an analysis of the prevalence of sugar consumption in children's diets.	The study identified a high prevalence of sugar consumption among the children evaluated, 62.10% consumed sweetened beverages and 42.23% consumed sweets or candies, with a daily consumption of 85.5%, associated with Socioeconomic factors, lower breastfeeding rates, and obesity risks.

Source: developed by the authors, 2026

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RESULTS AND DISCUSSION

The selected studies show diversity in the approaches employed, including one randomized trial, one observational study, three longitudinal studies, and one cross-sectional study, which contributes to a more comprehensive analysis of the early introduction of sugar and its possible repercussions on the development of chronic diseases. According to the analyzed research, a consistent pattern of early introduction of sugars and ultra-processed foods into children's diets is observed, associated with negative impacts on eating habits and nutritional status throughout childhood.

The study by Franco, T. *et al.* (2024), conducted in São Paulo with 31 children under two years of age attending a referral center, showed a high prevalence of early consumption of sugary foods and drinks. The results indicated that 77.4% of the children had already consumed these foods, demonstrating early exposure to sugar. This finding becomes even more relevant when considering that the children evaluated presented feeding difficulties, which favors a preference for foods that are more readily accepted, especially those rich in sugars.

Similar results were found in the study by Reis, R. *et al.* (2022) conducted in a municipality in the interior of São Paulo with 599 children aged 6 to 24 months, which showed a high frequency of sugar consumption among the children evaluated. It was found that 62.23% consumed sweetened beverages and 43.23% ingested sweets and candies, with 85.5% reporting daily consumption of these foods. Furthermore, this pattern was associated with socioeconomic factors, shorter duration of breastfeeding, and higher risks for obesity.

This scenario is reinforced by Louzada, M. *et al.* (2021), in a study based on research involving children, adolescents, and adults, aiming to analyze the impacts of ultra-processed food consumption on health. They indicate that frequent consumption of ultra-processed foods contributes to a decline in diet quality and the development of obesity. Although the findings of this study present similar results and corroborate the evidence found in the articles included in this review, it was not selected for the final sample because it was a scoping review and outside the established time frame.

In this same context, the study conducted by Kay, M. *et al.* (2023), with 406 children aged 2 to 24 months in four pediatric clinics, indicated that more than 80% of the children consumed natural fruit juice sweetened with conventional sugar daily, in quantities far exceeding the recommended amount. Furthermore, this early introduction was associated with greater consumption of the juice over time. The authors also demonstrate, according to the results, a concern regarding the excessive consumption of these juices in childhood, since it can

replace nutritionally more adequate beverages such as breast milk, infant formula, and water, in addition to contributing to the early formation of preferences for sweet flavors.

In line with these findings, research conducted by Backer, P. *et al.* (2023), carried out with 400 mother-child pairs in three public hospitals, demonstrated that the early introduction of sugar occurred mainly through juices. Among the participants, 96% received natural juices, 17.3% artificial juices, 5.3% diluted juices, and 2.7% concentrated juices. Introducing sugar before six months of age was associated with higher consumption of sugary drinks and sweet foods in preschool age. Furthermore, a significant increase in the prevalence of overweight and obesity was observed during the follow-up period, rising from 5.8% to 26.2%, highlighting the negative impact of early sugar exposure on children's nutritional status.

According to research conducted by Dharod *et al.* (2025), conducted in the United States with 234 infants aged 6, 9, and 12 months, The contribution of infant formulas and complementary foods as important sources of added sugars in infant diets during the first year of life was highlighted, which can favor the development of health problems. In line with this finding, the study by Huang, J. *et al.* (2018), conducted with 1,093 infants between 3 and 12 months of age, demonstrated that the consumption of larger volumes of infant formula in the first months of life is associated with increased body weight and a higher risk of childhood overweight. Although this research was not included in the present review due to the established time frame, its results are consistent with the analyzed findings, reinforcing the relationship between inadequate early feeding and harm to infant nutritional status.

Complementing these findings, the research conducted by Barratto *et al.* (2025), conducted in Porto Alegre with 715 mothers and their children, in which data was collected through the assessment of dietary patterns and nutritional status. The results indicated that high consumption of ultra-processed foods was associated with increased overweight and childhood obesity, a situation exacerbated by excessive weight gain between 6 and 12 months of age, a period in which higher consumption of baby bottles, juices, and sweetened beverages was also observed.

It was observed that five of the six studies analyzed (Barrato , P. *et al.* 2025; Franco, T. *et al.* 2024; Backer, P. *et al.* 2023; Dharod , J. *et al.* 2025; Reis, R. *et al.* 2022) highlight the need for training for health professionals and the implementation of public policies aimed at reducing early sugar consumption in childhood. These findings demonstrate the importance of food and nutrition education actions as strategies for preventing inadequate eating habits and future diseases.

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CONCLUSION

Based on the evidence presented, it is observed that the early introduction of sugar into children's diets remains frequent, occurring mainly through the consumption of sugary drinks, juices, infant formulas, and ultra-processed foods. The studies analyzed demonstrated an association between this practice and the formation of inadequate eating habits, as well as an increased risk of overweight, obesity, and other health problems throughout childhood.

The findings also showed that socioeconomic factors, along with shorter breastfeeding duration and inadequate practices during the introduction of solid foods, can favor early exposure to sugar. In this context, the importance of strengthening public policies promoting healthy eating and food and nutrition education initiatives is highlighted, considering their potential to prevent and promote better health conditions from the earliest years of life.

Although the studies analyzed presented convergent results, methodological differences were observed related to sample characteristics, data collection instruments, and follow-up periods, which may influence the comparison between the results. Furthermore, the small number of studies selected demonstrates the need to expand research on this topic in different population contexts.

The evidence gathered in this review demonstrates that the early introduction of sugar constitutes a significant challenge for children's health. Therefore, it is essential to expand research on this topic and strengthen actions that promote healthy eating habits from childhood, contributing to the prevention of health problems and a better quality of life.

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