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AMAMENTAÇÃO PROLONGADA E O RISCO DE CÁRIE DENTÁRIA NA INFÂNCIA : UMA REVISÃO SISTEMÁTICA E META-ANÁLISE

ANÁPOLIS, 2024

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Dissertação apresentada à Faculdade de odontologia do Centro Universitário de Anápolis – UniEVANGÉLICA, para obtenção do título de Mestre em Odontologia na Área de Clínica Odontológica.

Orientador: Prof. Dr. Brunno Santos de Freitas Silva

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SUMÁRIO

RESUMO

Existe uma preocupação com o aleitamento materno prolongado e sua associação com maior risco de cárie dentária. Apesar da investigação em curso, existem evidências contraditórias relativas à relação entre a amamentação prolongada e o risco de cárie na dentição decídua em crianças até aos 71 meses de idade. O objetivo deste estudo foi investigar as evidências atuais sobre a amamentação prolongada e determinar se ela representa um risco de cárie dentária na infância. Foi conduzida uma uma revisão sistemática e metanálise seguindo as recomendações do PRISMA (2020) sendo, inicialmente, feita uma busca eletrônica em seis bases de dados principais da área de saúde e, adicionalmente, a busca na literatura cinzenta, sem restrições de linguagem ou data da publicação. A leitura dos estudos foi conduzida em duas fases, de forma independente, em que três revisores avaliaram os títulos e resumos e, posteriormente, leram os estudos completos para a realização da inclusão dos estudos, foram incluídos estudos observacionais que comparam o risco de cárie dentária em crianças até 71 meses de idade que tenham sido submetidas a amamentação prolongada. A avaliação do risco de viés foi feita através da ferramenta de avaliação crítica para estudos de coorte, por meio de três revisores independentes. Além disso, os estudos foram sintetizados qualitativamente e quantitativamente, com a descrição das principais características do estudo e de sua amostra. Os resultados mostraram que o risco de carie precoce na infância é 3 vezes maior em crianças amamentadas por mais de 24 meses com leite materno. Com a realização desta revisão sistemática, foi possível observar uma correlação significativa em relação aos períodos prolongados de amamentação e uma elevação do risco de cárie dentária.

PALAVRAS-CHAVE: Aleitamento materno**;** Cárie Dentária; Criança; Leite

ABSTRACT

There is concern about prolonged breastfeeding and its association with an increased risk of dental caries. Despite ongoing research, there is conflicting evidence regarding the relationship between prolonged breastfeeding and the risk of caries in primary dentition in children up to 71 months of age. The aim of this study was to investigate the current evidence on prolonged breastfeeding and determine whether it poses a risk of dental caries in childhood. A systematic review and meta-analysis was conducted following the PRISMA (2020) recommendations, initially by conducting an electronic search in six main health databases and, additionally, by searching the gray literature, with no restrictions on language or date of publication. The reading of the studies was conducted in two phases, independently, in which three reviewers evaluated the titles and abstracts and, subsequently, read the full studies to carry out the inclusion of the studies; observational studies that compared the risk of dental caries in children up to 71 months of age who had been subjected to prolonged breastfeeding were included. The risk of bias was assessed using the critical appraisal tool for cohort studies, by three independent reviewers. In addition, the studies were qualitatively and quantitatively synthesized, with a description of the main characteristics of the study and its sample. The results showed that the risk of early childhood caries is 3 times higher in children breastfed for more than 24 months with breast milk. By conducting this systematic review, it was possible to observe a significant correlation between prolonged periods of breastfeeding and an increased risk of dental caries.

KEYWORDS: Breast-feeding; Dental cavity; Child; Milk

1. INTRODUÇÃO E REFERENCIAL TEÓRICO

De acordo com as diretrizes da Organização Mundial de Saúde (OMS, 2003), é altamente recomendado que bebês com até 6 meses de idade sejam alimentados exclusivamente com leite materno.

Entretanto, não há vantagens em se iniciar os alimentos complementares antes dos seis meses, podendo, inclusive, haver prejuízos à saúde da criança, pois a introdução precoce de outros alimentos está associada a maior número de episódios de diarréia, maior número de hospitalização por doença respiratória, risco de desnutrição se os alimentos introduzidos forem nutricionalmente inferior ao leite materno, menor absorção de nutrientes importantes do leite materno, como ferro e zinco (MINISTÉRIO DA SAÚDE, 2000).

Ademais, é importante ressaltar que o leite materno é uma fonte completa de nutrição para o bebê, fornecendo não apenas os nutrientes necessários, mas também proteção contra infecções. Essa proteção adicional ajuda a diminuir a taxa de mortalidade infantil, devido às diversas substâncias presentes no leite materno que oferecem essa proteção extra (GOMES, et al, 2020). Segundo o estudo de JONES, 2003, a taxa de mortalidade é menor entre crianças que são amamentadas. Calcula-se que a prática do aleitamento materno poderia prevenir cerca de 13% das mortes em crianças menores de 5 anos em escala global, causadas por eventos evitáveis.

Além disso, KRAMER E KAKUMA, 2012, evidenciaram que o ato de amamentar desempenha um papel crucial no estabelecimento de um forte vínculo emocional entre mãe e filho, promove o desenvolvimento psicossocial do bebê recém-nascido e fornece orientações seguras para o seu crescimento e desenvolvimento.

Em relação a doença cárie, é importante ressaltar que ela é uma doença crônica comum na infância e com alta prevalência em todo o mundo. A prevenção e o controle da cárie dentária em dentes decíduos são desafiadores e esta condição é considerada um problema de saúde pública devido aos elevados custos para a sociedade e também ao impacto negativo na qualidade de vida das crianças afetadas e de seus familiares (BARROSO et al., 2021).

Trata-se de uma doença multifatorial, dependente do aproveitamento de carboidratos fermentáveis por microrganismos acidogênicos e acidúricos, aderidos

sobre as superfícies dentárias (TAKAHASHI E NYVAD, 2008). Em virtude disso, a combinação de hábitos de higiene bucal inadequados e amamentação por livre demanda, estendendo-se irrestritamente durante o período noturno, pode determinar o quadro clínico de cárie precoce da infância (CPI) (PRAKASH, et al, 2012).

CRUVINEL et al.,2016, explica que o desmame natural tardio poderia aumentar o risco para o desenvolvimento de cárie precoce da infância (CPI), caracterizada pela destruição coronária acentuada dos dentes decíduos incisivos superiores em idade precoce, sendo os comprometimentos funcional e estético possíveis conseqüências para o bebê

Vale salientar que, conforme indicado pela Organização Mundial da Saúde (OMS) e o Ministério da Saúde, que não existe uma definição acordada em relação à amamentação prolongada, mas é considerada acima do período mínimo recomendado pela Organização Mundial da Saúde (OMS, 2003), ou seja, dois anos de idade e essa amamentação acima dos dois anos, segundo o estudo de CRUVINEL et al, 2016 poderia promover o aumento da proporção de microrganismos acidogênicos no biofilme dentário, contribuindo para a progressão da doença.

Além do mais, uma duração mais longa da amamentação, no entanto, nem sempre confere benefícios à saúde. Um risco aumentado de cárie dentária associado à amamentação prolongada foi relatado em vários estudos (YONEZU ET AL., 2006; SARAIVA ET AL., 2007; FELDENS ET AL., 2012; PRAKASHA SHRUTHA E OUTROS, 2013; CHAFFEE ET AL., 2014; HONG ET AL., 2014; NOBILI ET AL., 2014; JAIN ET AL., 2015; KATO ET AL., 2015). Ainda assim, Comparado ao leite de vaca, o leite humano apresenta mais propriedades cariogênicas responsáveis pela cárie dentária, pois contém mais carboidratos, menos cálcio, fósforo e proteínas (ERICKSON E MAZHARI, 1999; BOWEN E LAWRENCE, 2000).

Dessa forma, existe uma preocupação com o aleitamento materno prolongado e sua associação com maior risco de cárie dentária. A *American Academy of Pediatric Dentistry* (AAPD, 2008) classifica cárie na primeira infância (CPI) como a presença de um ou mais dentes cariados, dentes perdidos ou superfícies obturadas em qualquer dente decíduo em uma criança com 71 meses ou menos.

As crianças que apresentam CPI têm maior probabilidade de desenvolver cárie na dentição permanente (AAPD, 2008).

Várias revisões sistemáticas abordaram esse tópico ao longo dos anos (Valaitis et al., 2000; Avila et al., 2015), apresentando evidências conflitantes em um contexto de inconsistência metodológica. Valaitis et al., em 2000, não confirmaram uma relação combinada entre CPI e amamentação. Eles observaram definições inconsistentes de CPI nos estudos incluídos, falta de design prospectivo e falta de controle para variáveis relevantes, como práticas de saúde bucal. Em 2015, Avila et al., concluíram com base em evidências reunidas que a amamentação pode proteger contra CPI, com um risco menor de CPI em comparação com crianças alimentadas com mamadeira (Avila et al., 2015).

Tham et al. (2015) avaliaram sistematicamente as associações entre amamentação e cárie dentária em períodos específicos da infância. Eles descobriram que a amamentação até 12 meses de idade reduziu o risco de cárie, mas houve um risco aumentado em crianças amamentadas por mais de 12 meses. Cui et al., em 2017, realizaram uma análise de estudos de caso-controle e coorte sobre o risco de CPI. Eles sugeriram que a amamentação pode proteger as crianças de CPI, mas pode se tornar um fator de risco para CPI quando a duração da amamentação se estende além de 12 meses. A meta-análise mais recente (Shrestha, 2024), que incluiu 9 estudos de caso-controle e 22 coortes, mostrou que a amamentação por mais de 12 meses e a amamentação noturna aumentam o risco de CPI.

Apesar das evidências mencionadas, há uma falta de consenso em relação à amamentação prolongada e ao risco de cárie precoce na infância (CPI), particularmente no contexto das recomendações da OMS para amamentação até 24 meses ou mais. Além disso, há uma necessidade de atualizar a meta-análise com novas evidências publicadas desde a última revisão. Assim, a presente revisão sistemática visa responder à seguinte questão focada: A amamentação prolongada representa um risco de cárie dentária em crianças de até 71 meses?

2. OBJETIVOS

3.1 OBJETIVO GERAL

O objetivo deste estudo foi investigar as evidências atuais sobre a amamentação prolongada e determinar seu risco para a cárie dentária.

3.2 OBJETIVOS ESPECÍFICOS

1. Determinar a incidência do risco de cárie na primeira infância associada à amamentação prolongada;
2. Determinar a prevalência do risco de cárie na primeira infância associada á amamentação prolongada;
3. Analisar a qualidade da evidência científica disponível sobre o assunto;
4. Verificar quais são as fontes de viés mais significativos nos estudos incluídos;
5. Identificar e analisar as lacunas na pesquisa existente e, com base nessa análise, formular recomendações para direcionar áreas de pesquisa futura relacionadas a esse tema;

3.METODOLOGIA

A presente revisão sistemática foi reportada seguindo as recomentações do PRISMA *Statement* (*Preferred Reporting Items for Stystematic Review and Meta-analyses*) (PAGE et al., 2020), e o protocolo foi registrado na plataforma *International Prospective Register of Systematic Reviews* (PROSPERO).

4.1 Registro do protocolo e pergunta de pesquisa

Esta revisão sistemática foi conduzida para responder a seguinte pergunta focada: *"A amamentação prolongada representa um risco de cárie dentária para crianças até 71 meses de idade? "* Após um mapeamento preliminar da literatura, chegou-se a conclusão que se trata de uma revisão de incidência. Portanto, foi utilizado o acrônimo PECOS para caracterizar a pergunta da revisão e para planejar as demais etapas desta pesquisa, conforme apresentado abaixo:

Tabela 1 – Descrição do acrônimo PECOS para a presente revisão sistemática.

P (Participantes)	Crianças com até 71 meses;
E (Exposição)	Amamentação prolongada;
C (Comparador)	Alimentação por mamadeira;
O (Desfecho)	Risco de desenvolvimento de cárie dentária;
S (Tipos de estudo)	Estudos observacionais coorte

4.2 Critérios de elegibilidade

4.2.1 Critérios de inclusão:

Foi incluídos estudos observacionais que comparam o risco de cárie dentária em crianças com até 71 meses de idade que foram submetidas a amamentação prolongada.

4.2.2 Critérios de exclusão:

- P (População): Crianças portadoras de doenças imunológicas sistêmicas, ou com síndromes com repercursão física, neurológica ou metabólica, ou com história de infecção crônica, ou histórico de nascimento prematuro (<36 semanas);
- E (Exposição): Outras práticas de alimentação que não foi mamadeira e aleitamento no peito;

- C (Comparador): Ausência de comparador;
- O (*Outcome* - Desfecho): Portador de hiplosia dentária ou outras anomalias do órgão dentário;
- S (*Study design* – Tipo de estudo): Revisões, cartas, opiniões pessoais, resumos de conferências, relato de caso ou série de casos serão excluídos.

4.3 Informações de busca

Para obtenção dos estudos primários foram realizadas buscas detalhadas nas seis principais bases de dados bibliográficas eletrônicas da área da saúde: PubMed, EMBASE, LILACS, Web of Science, Scopus e Livivo. Realizou uma pesquisa adicional na literatura cinzenta utilizando-se as bases Google Scholar e ProQuest Dissertations and Theses Global. Na base de dados Google Scholar foram recuperados apenas os 100 primeiros trabalhos, sendo incluídos apenas os disponíveis em pdf. A estratégia de busca foi individualizada para cada base de dados utilizadas na pesquisa, sendo composta por combinações específicas de palavras e truncamentos, e realizada com o apoio de uma bibliotecária da área da saúde. Além disso, foi realizado uma busca manual nas listas de referências dos artigos incluídos. Nenhuma restrição de idioma ou tempo foi aplicada nesta revisão.

4.4 Estratégia de busca

Palavras-chave específicas sobre cada um dos itens do acrônimo PECOS, apresentados anteriormente, foram combinadas utilizando operadores booleanos (AND, OR). Para cada base de dados a estratégia de busca foi adaptada com o suporte de uma bibliotecária especializada na literatura na área da saúde. Foram utilizados termos controlados específicos de cada uma das bases, como, por exemplo, Mesh, DeCs e Emtree, quando necessário, e termos livres obtidos na literatura sentinela utilizada para elaboração deste projeto.

Preliminarmente, foi realizada a combinação de descritores pertinentes na base de dados do PubMed, conforme apresentado abaixo:

Search	Query	Results
#3	#1 AND #2	977
#2	("Dental Caries"[MeSH Terms] OR "Dental Caries"[All Fields] OR "Dental Cavity"[All Fields] OR "Dental Decay"[All Fields] OR "Dental Cavities"[All Fields] OR "Carious Lesions"[All Fields] OR "Carious Lesion"[All Fields] OR "Carious Dentin"[All Fields] OR "Dental White Spot"[All Fields] OR "Dental White Spots"[All Fields] OR "caries dental"[All Fields] OR "cavities dental"[All Fields] OR "cavity dental"[All Fields] OR "lesions carious"[All Fields] OR "decay dental"[All Fields] OR "dentin carious"[All Fields] OR "white spot dental"[All Fields] OR "Early childhood caries"[All Fields] OR "Tooth Demineralization"[MeSH Terms] OR "Tooth Demineralization"[All Fields])	71,217
#1	("Breast Feeding"[MeSH Terms] OR "Breast Feeding"[All Fields] OR "Breastfed"[All Fields] OR "Breastfeeding"[All Fields] OR "Breast Fed"[All Fields] OR "Milk Sharing"[All Fields] OR "Exclusive Breast Feeding"[All Fields] OR "Exclusive Breastfeeding"[All Fields] OR "Wet Nursing"[All Fields] OR "sharing milk"[All Fields] OR "breast feeding exclusive"[All Fields] OR "breastfeeding exclusive"[All Fields] OR "Lactation"[MeSH Terms] OR "Lactation"[All Fields] OR "lactations"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Prolonged Lactation"[All Fields] OR "Prolonged Lactations"[All Fields] OR "Prolonged breast feeding"[All Fields] OR "Prolonged breastfeeding"[All Fields] OR "lactation prolonged"[All Fields] OR "milk, human"[MeSH Terms] OR "Breast Milk"[All Fields] OR "Human Milk"[All Fields] OR "milk breast"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Bottle Feeding"[MeSH Terms] OR "Bottle Feeding"[All Fields] OR "Bottlefeeding"[All Fields] OR "Bottlefed"[All Fields])	145,509

A estratégia da base de dados PubMed/Medline foi utilizada como referência para a estratégia de busca das outras bases pesquisadas neste estudo (APÊNDICE).

4.5 Seleção dos estudos

As referências dos estudos obtidos por meio das buscas específicas nas bases de dados foram manuseados com o auxílio do *software EndNote Desktop X9 (Bld 12062, U.S. Patents) e* os duplicados foram removidos. Posteriormente, foi adotado o processo de duas fases para seleção dos estudos: Na fase 1, três revisores (K.O.L, R.M.R e L.R.S.R.) avaliaram os títulos e resumos dos resultados da pesquisa de maneira independente, a fim de identificar os estudos elegíveis com base nos critérios de elegibilidade.

Na fase 2, os estudos foram lidos completamente pelos mesmos revisores de maneira independente para confirmação da inclusão. Em caso de discordância entre os três revisores, ela foi resolvida em discussão consultando um quarto revisor *expert* no assunto e coordenador deste trabalho (B.S.F.S.). As referências excluídas, e o respectivo motivo para exclusão, serão apresentados de forma geral no fluxograma de seleção dos estudos, de forma detalhada, com a tabela dos artigos excluídos e o motivo da exclusão (Apêndice 2).

4.6 Extração dos dados

Para a extração dos dados dos estudos primários o processo de revisão também foi ralizado pelos mesmos três revisores das fases anteriores, de forma independente, para coleta de informações e posterior comparação. Em caso de discordância nesta fase, ela era resolvida em discussão e, o consenso final era obtido com auxílio do quarto revisor. Foram coletadas informações para caracterização do estudo (autor e ano), características da população ou amostra (país, tamanho amostral, gênero, faixa etária), características clínicas e incidência de dentes cariados, restaurados, extraídos em cada grupo (amamentação exclusiva, amamentação prolongada, alimentação exclusiva com mamadeira e mamadeira prolongada), critérios diagnósticos para cárie dentária (OMS, ICDAS); confundidores identificados, e principais conclusões. Além disso, foram coletados os dados apresentados pelos estudos quanto aos valores de Razão de Risco (RR), Razão de Chance (Odds ratio – OD), Razão de Incidência Padronizada (Standardized Incidence Ratio – SIR). Caso os dados necessários não estiverem completos ou ausentes, 3 (três) tentativas de contato com os autores foram realizadas para acessar as informações omitidas.

4.7 Avaliação do risco de viés e aplicabilidade

A avaliação do risco de viés foi feita através da ferramenta de avaliação crítica JBI (Joanna Briggs Institute) para estudos de coorte (MOOLA et al., 2020) por meio de três revisores independentes (K.O.L, R.M.R e L.R.S.R.). Nos casos de discordância, o quarto revisor era consultado para obtenção do consenso.

A lista de verificação de avaliação crítica para estudos de coorte avalia o risco de viés em 11 pontos:

A origem e semelhança dos dois grupos;
A semelhança nas medidas das exposições nos grupos expostos e não expostos;
A confiabilidade da exposição;
Presença de fatores de confusão;
Estratégias para lidar com os fatores de confusão;
Os grupos/participantes livres do desfecho no início do estudo (ou no momento da exposição);
A confiabilidade dos resultados;
O tempo de acompanhamento suficiente;
O acompanhamento completo;
.Estratégias para lidar com o acompanhamento incompleto;
.Análise estatística apropriada.

Em cada um dos desses pontos foi avaliado o risco de viés através de perguntas sinalizadoras que, por sua vez, permitem classificá-los em sim, não, obscuro e não aplicável. Após essa avaliação, foi produzido uma tabela, com análise de cada domínio de avaliação (pergunta sinalizadora), um gráfico de risco de viés e um sumário do risco de viés, por meio do software RevMan (version 5.3; The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark).

4.8 Síntese dos resultados

Os estudos incluídos foram sintetizados qualitativamente, com a descrição das principais características do estudo e de sua amostra.

Uma análise quantitativa dos dados foi feita entre os estudos de coorte, a metanálise foi conduzida pelo software MetaXL (versão 5.3; EpiGear International 7 Pty Ltd., Sunrise Beach, Queensland, Australia) uma extensão no Microsoft Excel 8 software (Microsoft Excel versão para Windows, CA, USA)

4.9 Métodos estatísticos (Metanálise)

Para a meta-análise foi utilizado o software Review Manager (versão 5.3) (*Review Manager - RevMan*, versão 5.4; A Colaboração Cochrane, 2020. Disponível online: https://revman.cochrane.org - acessado em 15 de maio de 2024).

A heterogeneidade entre os estudos foi avaliada por meio do teste Q de Cochran e do índice I^2. Um índice I^2 de 0–30% indicou heterogeneidade insignificante, 30–50% indicou heterogeneidade moderada, 50–90% indicou heterogeneidade substancial e acima de 90% indicou heterogeneidade considerável (Higgins et al., 2019). Dependendo do grau de heterogeneidade, modelos de efeito fixo ou efeitos aleatórios foram empregados para combinar os dados (Borenstein et al., 2010).

Tentamos realizar análises de sensibilidade, excluindo um estudo de cada vez, para rastrear estudos que pudessem estimar ou subestimar demais os resultados. Além disso, foi planejada uma análise de subgrupos para separar os estudos de acordo com as medidas de desfecho utilizadas, considerando se eram medidas de incidência ou prevalência e se os dados eram ajustados ou brutos. Não foram realizadas análises de subgrupos considerando o aleitamento materno noturno, pois a ausência de relato dessa prática nos estudos não indica necessariamente que ela estivesse ausente na amostra. Todas as análises estatísticas foram realizadas em um nível de significância pré-determinado de 0,05 e IC 95%.

4.10 Avaliação de viés de relatório

Avaliamos o viés de publicação dos estudos incluídos usando o software JAMOVI (The Jamovi Project. *Jamovi*, Versão 2.3. 2023. Disponível online: https://www.jamovi.org - acessado em 14 de maio de 2024), calculando o teste de correlação de classificação (Begg & Mazumdar, 1994), o método N à prova de falhas (Rosenthal, 1979) e o teste de regressão para assimetria de gráfico de funil (Egger et al., 1997).

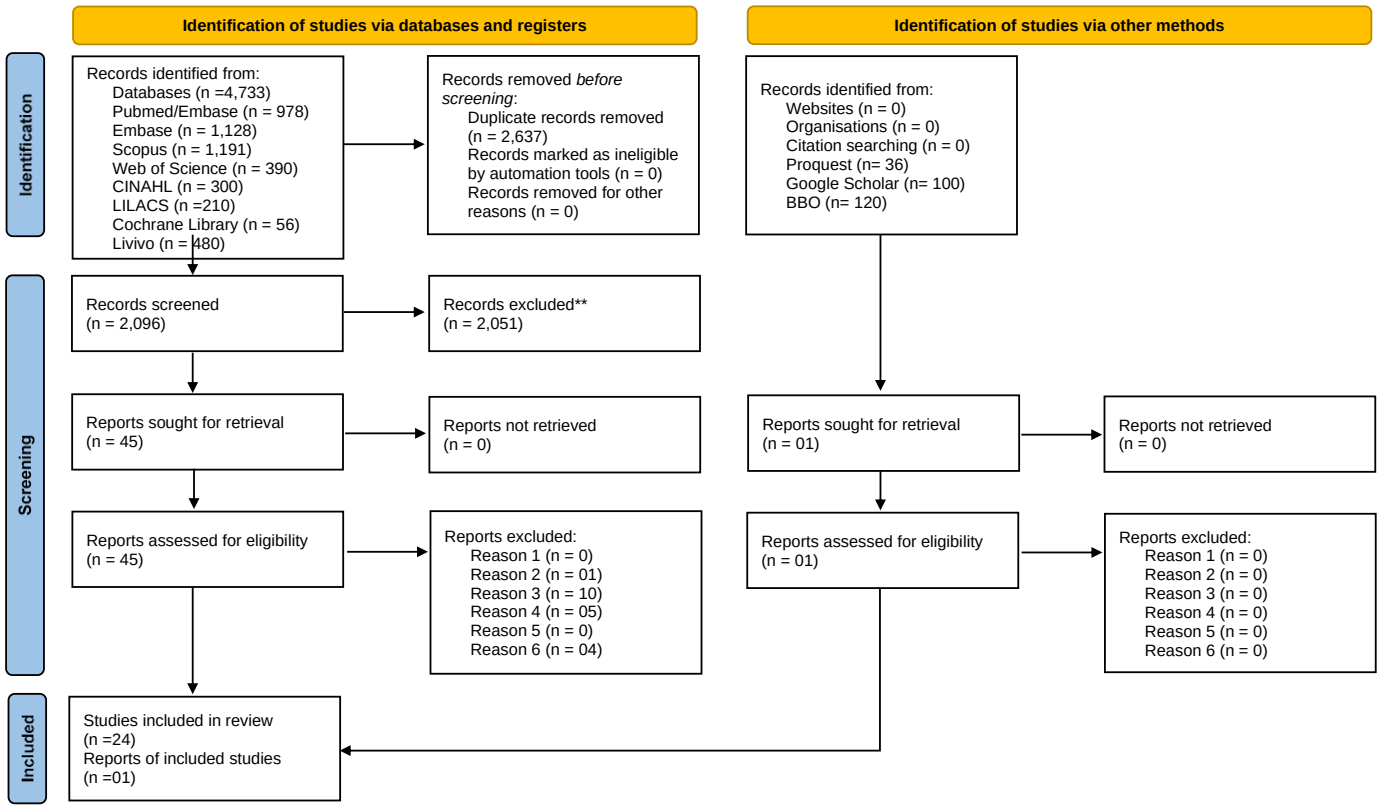
4.11 Avaliação de certeza da evidência

Avaliamos a certeza da evidência usando o sistema Grades of Recommendation, Assessment, Development, and Evaluation (GRADE). Essa ferramenta compreende cinco domínios: risco de viés, inconsistência, evidência indireta, imprecisão e viés de publicação. O nível de certeza para o corpo de evidências é categorizado como alto, moderado, baixo ou muito baixo (Schünemann et al., 2019). A tabela de resumo dos resultados foi produzida usando o software online Grading of Recommendations Assessment, Development and Evaluation (GRADEpro GTD) (Manheimer, 2012).

4. RESULTADOS

Seleção dos estudos

Na Fase 1, uma busca em 8 principais bases de dados eletrônicas rendeu 4.733 referências. Após a remoção das duplicatas, restaram 2.095 referências para a avaliação do título e do resumo. Na Fase 2, 45 estudos foram submetidos a uma avaliação abrangente do texto completo. Aplicando os critérios de elegibilidade, restaram 24 estudos para análise posterior. Uma pesquisa adicional na literatura cinzenta rendeu mais 1 estudo. Outras pesquisas manuais nas listas de referências dos 25 artigos incluídos não produziram nenhum estudo adicional. As razões específicas para a exclusão na Fase 2 são apresentadas no Apêndice 2. O processo de seleção detalhado é ilustrado no diagrama de fluxo do processo de seleção na Figura 1.



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

Figura 1. Fluxograma PRISMA 2020 para pesquisa e seleção dos estudos em 19 revisões sistemáticas

Características do estudo

Dos 25 estudos selecionados, 8 apresentaram dados de incidência sobre o risco de cárie no aleitamento materno prolongado (Barroso et al., 2021; Birungi et al., 2017; Feldens et al., 2010; Feldens et al., 2018; Mathias et al., 2023; Nunes et al., 2012; Nirunsittirat et al., 2016; Sritangsirikul et al., 2024), e 17 apresentaram dados de prevalência (Abanto et al., 2022; Bernabé et al., 2016; Blanco et al., 2021; Chaffee et al., 2014; Devenish et al., 2020; Helderman et al., 2006; Hong et al., 2014; Ibrahim et al., 2009; Ji et al., 2006; Lunteren et al., 2020; Nakamura, 2009; Peres et al., 2017; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Tada et al., 1999; Tashiro et al., 2021; Yokoi et al., 2021).

A maioria dos estudos foi do Brasil (Abanto et al., 2022; Barroso et al., 2021; Chaffee et al., 2014; Feldens et al., 2010; Feldens et al., 2018; Mathias et al., 2023; Nakamura, 2009; Nunes et al., 2012; Peres et al., 2017; Pires et al., 2020), seguido pelo

Japão (Ibrahim et al., 2009; Ji et al., 2006; Tada et al., 1999; Tashiro et al., 2021; Yokoi et al., 2021), Tailândia (Nirunsittirat et al., 2016; Sritangsirikul et al., 2024) e outros países representados por um estudo cada: Escócia (Bernabé et al., 2016), Uganda (Birungi et al., 2017), Espanha (Blanco et al., 2021), Austrália (Devenish et al., 2020), Mianmar (Helderman et al., 2006), Estados Unidos (Hong et al., 2014), Holanda (Lunteren et al., 2020) e Noruega (Sæthre, Wang & Wigen, 2023). A distribuição geográfica completa da amostra e sua representação na amostra agrupada são ilustradas na Figura 2. Essas coortes foram publicadas entre 1999 e 2024, com tamanhos de amostra variando de 132 a 4.146 participantes. A amostra agrupada incluiu 19.681 participantes. Doze dos 25 estudos selecionados forneceram a proporção de homens para mulheres, resultando em uma proporção combinada de 1,07:1. A maioria dos estudos de coorte relatou períodos de acompanhamento variando de 1 a 9 anos.

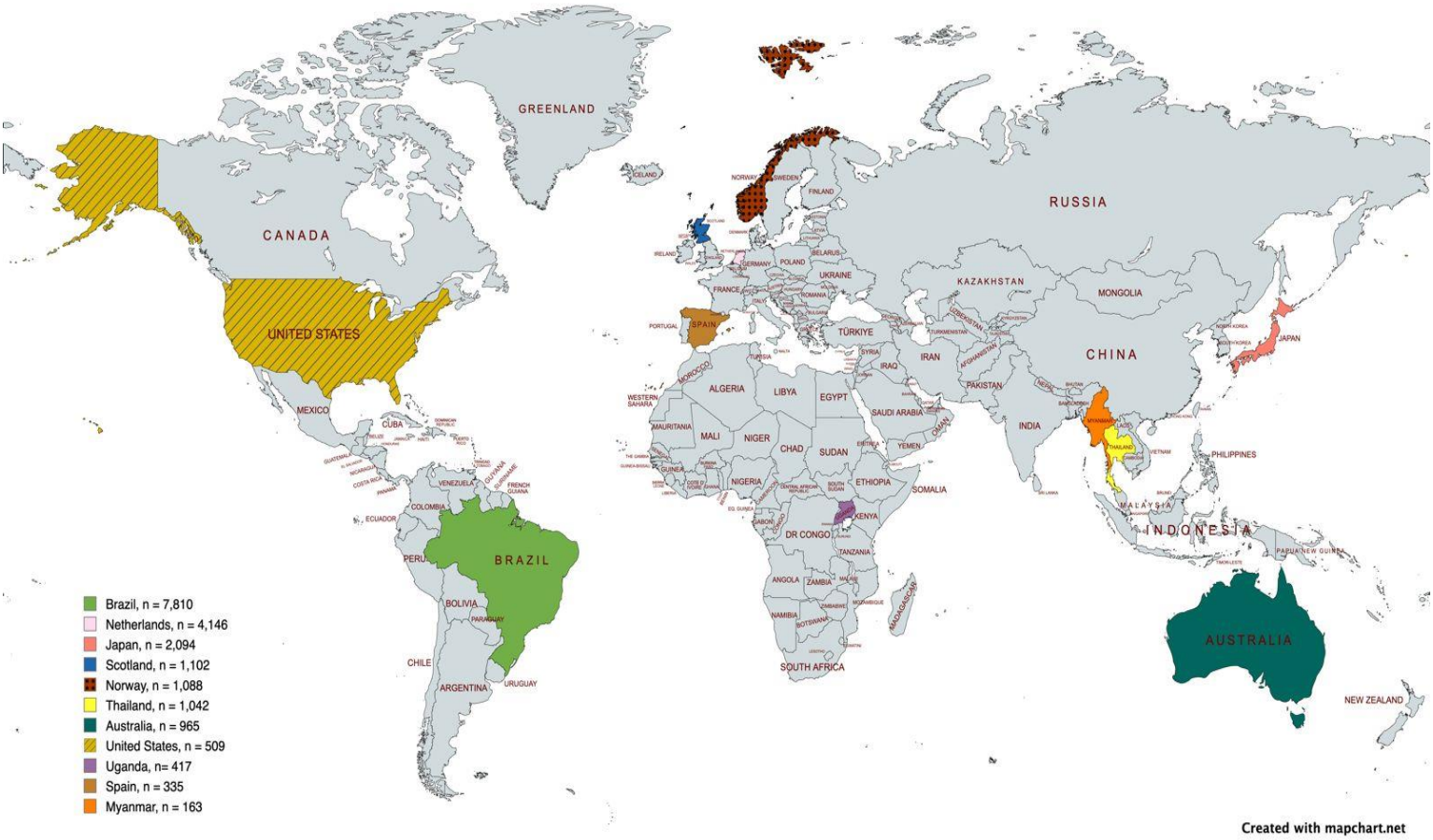


Figura 2. Distribuição geográfica completa da amostra dos estudos incluídos.

O principal critério adotado nos estudos para o diagnóstico de cárie dentária foram os critérios da OMS (Abanto et al., 2022; Birungi et al., 2017; Chaffee et al., 2014; Devenish et al., 2020; Feldens et al., 2010; Feldens et al., 2018; Hong et al., 2014; Nakamura, 2009; Nirunsittirat et al., 2016; Nunes et al., 2012; Sritangsirikul et al., 2024; Tada et al., 1999; Yokoi et al., 2021). Um estudo adotou o Sistema Internacional de Detecção e Avaliação de Cárie (ICDAS) (Barroso et al., 2021), e 11 estudos não relataram os critérios adotados (Bernabé et al., 2016; Blanco et al., 2021; Helderman et al., 2006; Ibrahim et al., 2009; Ji et al., 2006; Lunteren et al., 2020; Mathias et al., 2023; Peres et al., 2017; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Tashiro et al., 2021). A alimentação noturna foi relatada em 7 estudos (Feldens et al., 2010; Helderman et al., 2006; Lunteren et al., 2020; Nunes et al., 2012; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Sritangsirikul et al., 2024), com uma mistura heterogênea de leite materno, leite de mamadeira e bebidas açucaradas. A dieta cariogênica foi avaliada por meio do consumo de produtos açucarados (Chaffee et al., 2014; Abanto et al., 2022; Barroso et al., 2021; Feldens et al., 2010; Feldens et al., 2018; Lunteren et al., 2020; Nirunsittirat et al., 2016; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Birungi et al., 2017) ou alimentos ultraprocessados (Mathias et al., 2023). A frequência de consumo de dieta cariogênica foi avaliada em alguns estudos (Blanco et al., 2021; Nirunsittirat et al., 2016; Lunteren et al., 2020; Birungi et al., 2017; Devenish et al., 2020; Sritangsirikul et al., 2024) e a quantidade em outros (Blanco et al., 2021). No entanto, 7 estudos não relataram o consumo de dietas cariogênicas (Peres et al., 2017; Nakamura, 2009; Ji et al., 2006; Ibrahim et al., 2009; Hong et al., 2014; Helderman et al., 2006; Bernabé et al., 2016). Em relação aos hábitos de higiene bucal, os principais relatos incluíram a frequência de escovação dentária (Abanto et al., 2022; Hong et al., 2014; Mathias et al., 2023; Nirunsittirat et al., 2016; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Tada et al., 1999; Tashiro et al., 2021; Sritangsirikul et al., 2024) e se foi supervisionado (Barroso et al., 2021; Ji et al., 2006; Tashiro et al., 2021). Alguns estudos relataram apenas a presença ou ausência de hábitos de higiene bucal (Feldens et al., 2010; Helderman et al., 2006), um analisou o índice de higiene bucal familiar (Birungi et al., 2017), enquanto outros não relataram esses hábitos (Devenish et al., 2020; Bernabé et al., 2016; Blanco et al., 2021; Chaffee et al., 2014; Feldens et al., 2018; Ibrahim et al., 2009; Lunteren et al., 2020; Nakamura, 2009; Nunes et al., 2012; Peres et al., 2017). O detalhamento dos dados extraídos se encontra na Tabela 1.

Tabela 1. Descrição detalhada das características dos estudos incluídos.

Author, Year	***Country***	***Study Design***	***Sample*** *(N)*	***Gender*** *(Male/Female)*	***Follow-up***	***Age Distribution*** *(Months)*	***Breastfeeding Duration*** *(<12 months; 12-24 months; >24 months))*	***Bottle Feeding Duration*** *(<12 months; 12-24 months; >24 months)*	***Criteria for Dental Caries Diagnosis***	***DMFT index****	***Nocturnal feeding*** *(yes or no)*	***Cariogenic diet*** *(yes or no/ description)*	***Oral hygiene habits*** *(yes or no and/or description)*	***Breastfeeding Frequency***	***Bottle feeding Frequency***	***Risk or dental caries (RR/HR/ OR 95% CI) and breastfeeding***	***Main conclusions***
Abanto et al., 2022.	,Brazil	Cohort	800	-	2 years	-	<12 months: 247 12-23 months: 439 ≥24 months: 114	No: 320 Yes: 480 *2 years old	WHO	-	-	No: 22 Yes: 778 1-3 times a day: 277 ≥4 times a day: 501	No: 25 Yes: 775 Toothbrushing Daily: 641 Weekly: 132	-	-	12-23 months: OR: 1.13 CI: 1.05-1.20 ≥24 months OR: 1.27 CI: 1.14-1.40 -	Prolonged breastfeeding is a weak risk factor for dental caries. Reduced sugar consumption at 2 years old mitigates this risk. With a 22.8% early childhood caries rate, focused interventions are crucial in the first 1000 days to promote healthy feeding, breastfeeding, and limited sugar intake.
Barroso et al., 2021	Brazil	Cohort	132	Male: 62 Female: 70	3 years	<24 months: 83 24-36 months: 49	< 24 months: 66 > 24 months: 66	< 24 months: 81 > 24 months: 51	ICDAS	-	No	Yes Low sugar consumption:70 High sugar consumption: 62	Supervised Toothbrushing: 108 Not Supervised Toothbrushing: 24	-	-	> 24 months: RR 2.24 CI:1.23-4.08	In conclusion, breastfeeding for more than 24 months was a risk factor for severe dental caries, alongside early childhood caries and non-nuclear family structure. Caution is needed when extrapolating these results due to uncontrolled

																variables like breastfeeding frequency and nighttime breastfeeding habits.
Bernabé et al., 2016	Scotland	Cohort	1.102	Male: 592 Female: 510	4 years	Birth-48 months	<6 months: no related >6 months: 194	-	-	-	-	-	-	-	-	Coefficient (linear mixed effects) <6 months: 0.02 CI: -0.23-0.28 >6 months: 0.06 CI: -0.25-0.37	This prospective study reveals that low birth weight and maternal smoking, rather than breastfeeding duration, were linked to caries progression from ages 1 to 4 in Scottish children.
Birungi et al., 2017	Uganda	Cohort	417	Male: 208 Female: 209	5 years	Birth-60 months	< 24 months: 196 > 24 months: 188	-	WHO	DMFT	-	Yes: Family sugar consumption index Less: 16% More 84%	Family oral hygiene index: Bad: 508 Good: 1577	-	-	Exclusive breastfeeding: IRR 0.60 CI: 0.41-0.88 > 24 months IRR 1.01 CI: 0.97-1.04	The study suggests that Directed Acyclic Graphs (DAGs) aided in assessing the causal impact of Exclusive Breastfeeding (EBF) on Early Childhood Caries (ECC) among 5-year-old Ugandan preschoolers. Results indicate a protective effect of 24 weeks of EBF on ECC. Further research, incorporating unmeasured variables from the DAGs, is crucial for robust causal assertions.

Blanco et al., 2021	Spain	Cohort	335	Male: 189 Female: 146	>12 months	48-60 months: 335	<12 months: 254 > 12 months: 81	-	-	-	-	Yes: Sugar ingestion (mg/day) Mean ingestion sugar a day: about: 110,58	-	-	-	1-3 months: Crude OR 0.93 CI: 0.25-3.4 3-6 months: Crude OR 0.76 CI: 0.25-2.32 6-9 months: Crude OR 0.38 CI: 0.07-1.93 9-12 months: Crude OR 1.97 CI: 0.67-5.78 >12 months: Crude OR 2.6 CI: 1.02-6.61	Breastfeeding for over 12 months correlates significantly with higher Early Childhood Caries (ECC) prevalence, while breastfeeding up to 12 months acts protectively against ECC. More research, incorporating fluoride toothpaste hygiene, is needed to explore this association further. No direct link was found between total energy or sugar intake and ECC prevalence.
Chaffee et al., 2014	Brazil	Cohort	715	-	38 months	36-48 months (715)	<12 months: 468 12-23: 65 > 24 months: 156	-	WHO	DMFS 3.2	-	Consuming sweet substances in bottle at age 5-9 months: 198 Consuming sweet substances in bottle at age 2-3 years: 312	-	-	-	6-11 months: PR 1.77 CI: 1.12-2.85 12-23 months: PR 1.82 CI: 0.85-3.20 24 or more months: PR 2.10 CI: 1.50-3.25	Finally, this study population, featuring a relatively high prevalence of breastfeeding and of caries, might not be representative of the breastfeeding -caries relationship in all historical, geographical, and socioeco-nomic contexts.
Devenish et al., 2020	Australia	Cohort	965	-	1 year	24-36 months	0-1months: 94 1-6 months: 257 6 to 12 months: 228	-	WHO	-	-	Yes: WHO guideline for sugars intake: Noncompliant: 134 Partially noncompliant: 224	-	-	-	0 to <1 month: PR 0.64. CI: 0.25-1.62 1 to < 6 months: PR 0.85 CI:0.46-1.56	The study found no connection between breastfeeding until at least 1 year of age, including nighttime breastfeeding, and early childhood caries by

							≥12 months: 386					Semi-compliant: 326 Compliant: 281				6 to 12 months: PR 1.00 > 12 months: PR 1.42 CI: 0.85-2.38	ages 2 to 3. It emphasizes the importance of promoting breastfeeding initiation and duration in accordance with global and national recommendations for overall health improvement.
Feldens et al.,2010.	Brazil	Cohort	340	-	4 years	48 months: 340	<12 months: 164 > 12 months: 176	-	WHO	-	12 months:197	Yes: 91	Yes, Toothbrushing with fluoride paste: 285	0-2: 192 3-6: 31 >7: 117	-	All 12 months: 0-2 daily: Crude RR 1.00 3-6 daily: Crude RR 2.04 CI: 1.22-3.39 7 or more daily: Crude RR 1.97 CI: 1.45-2.68	In conclusion, targeting early dietary factors associated with Severe Early Childhood Caries (S-ECC), programs for infants and toddlers should stress reducing high-sugar foods and maintaining meal intervals. Further research is urged to develop strategies for complex feeding practices, while emphasizing maternal education to combat childhood diseases.
Feldens et al., 2018	Brazil	Cohort	345	-	38 months	38 months: 345	at 12 months: 174	-	WHO	D1MFT: 345	-	Yes: Sugar introduction before age 6 months: 344	-	-	-	All 12 months: Moderate/high frequency mixed-feeding (both 1 or more/day): RR 1.45 CI: 1.02-2.07 High-frequency bottle-use	In this population, a correlation was found between feeding frequency at 12 months—including breastfeeding and bottle use—and dental caries status at age 3. Preventive measures

																only (>3/day): RR 1.37 CI: 0.98-1.92 High-frequency breastfeeding only (>3/day): RR 1.82 CI: 1.28-2.57	could include promoting less frequent nursing once complementary foods are introduced and limiting snack and drink frequency. Feeding advice should consider both nutritional needs and caregivers' beliefs.
Helderman et al., 2006.	Myanmar	Cohort	163	Male: 84 Female: 79	3 years	25 to <27 months: 41 > 27 to 30 months: 122	Low 50%: 81 High 50%: 82	-	-	-	Breast nipple in child's mouth at night: No: 122 Yes:41	-	Toothbrushing before the age of 18 moths: No 147 Yes: 16	-	-	All 12 months: > 4 daytime breastfeeding: Crude OR 4.9 CI: 0.9 25.3 > 15 min/breastfeeding (day): Crude OR 3.9 CI: 0.8-19.1	The present study indicates that, besides the known caries-inducing factors such as consumption of sugars, the consumption of pre-chewed rice and nocturnal breastfeeding after the age of 12 months pose a risk for the child's developing ECC in this Myanmar community.
Hong et al., 2014.	United States	Cohort	509	-	9 years	-	6 months: 361 6-12 months: 92 >12 months: 56	-	WHO	-	-	-	Yes, Daily fluoride intake Tooth-brushing	-	-	Prevalence: < 6 months: 25% > 6 months: 19%	Continuing breastfeeding beyond six months appears to lower the risk of early childhood caries in the early years. Further research with comprehensive data on breastfeeding patterns, duration, quality, and quantity, along with early-life caries examination

																	data, is needed.
Ibrahim et al., 2009.	Osaka, Japan	Cohort	283	-	3.5 years	36 - 48 months: 283	-	-	-	-	-	-	-	-	-	18 months: Crude OR 4.7 CI: 0.9-24 30 months: Crude OR 2.4 CI: 0.6-9.2	The Cariostat score at 1.5 years not only reflects current oral health but also predicts oral condition at 2.5 and 3.5 years. Similarly, the score at 2.5 years demonstrates this predictive ability. Children's lifestyle evolves with age, potentially impacting their caries risk status.
Ji et al., 2006	Japan	Cohort	392	-	3.5 years	36-48 months: 392	-	-	-	-	-	-	Yes, Supervised Toothbrushing	-	-	18 months: Crude OR 3.26 CI: 1.60-6.62 30 months: Crude OR 5.54 CI: 0.97-31.67	Breast feeding was the most influential factor. Actually in this study, breast feeding was the preferred with time of infant feeding before sleeping or during midnight. We found that 18-month-old children who breast-fed during waking hours oral ready weaned compared with breast feeding children, are not likely to be at higher risk for caries experience when the

																	children was 42-month-old.
Lunteren et al., 2020	Netherlands	Cohort	4146	-	6 years	-	Breastfeeding duration: 0-6 months: 1980 6-12 months: 850 >12 months:386	-	-	DMFT=0 n=2988 DMFT>0: n=1158	Never: 2832 Ever: 409 Missing data: 905	Intake of sugar-containing products at 6 years Low (≤2 times per day):1407 High: (> 2 times per day): 2739	-	-	-	0-6 months: OR 1.00 6-12 months: OR 1.13 CI: 0.92-1.38 >12 months: OR 1.35 (CI: 1.04-1.74	We have shown that prolonged breastfeeding as well as bottle-feeding during the night are associated with an increased risk of childhood dental caries. Our findings confirm the results of earlier studies in other countries and add that the associations are independent of SEP and sugar intake, and also exist in a European context that is without water fluoridation. Although future studies are encouraged that will study the potential mechanism be-tween prolonged breastfeeding and dental caries in more detail, the evidence so far clearly shows a higher risk of dental caries in children being breastfed for >12 months.

Mathias et al., 2023	Brazil	Cohort	3645	Male: 1840 Female: 1805	4 years	36-48 months	< 24 months: 2600 >24 months: 968	-	-	-	-	Yes UPF: Low/medium: 2591 High: 986	Yes, Frequency of toothbrushing: < 2 times a day: 1046 > 2 times a day: 2529	-	-	< 24 months breastfeeding: RR 1.00 > 24 months breastfeeding: RR 2.47 CI: 1.97-3.10	In conclusion, this study found no interaction between breastfeeding and UPF consumption, showing that the two exposures have different role on risk of ECC. The findings of the present study reinforce the need to adopt effective strategies to reduce the consumption of UPF and sugar-sweetened beverages in the early stages of life, and paediatric dentists should consider the potential caries risk of breastfeeding for 24months or beyond.
Nakamura, 2009.	Brazil	doctoral thesis	135	-	2 years and 11 months	<35 months	-	-	WHO	-	-	-	-	-	-	OR: 31.1136 CI: 4.50-215.15	Incidence of ECC in babies indicate a strong polarization of dental caries in this sample, whose elements showed high susceptibility to caries, characterized by a high incidence in a short period after eruption, with the largest number of lesions occurred in the period corresponding to the

																	infectivity window.
Nirunsittirat et al., 2016	Thailand	Cohort	556	Female:276 Male: 280	3-4 years	36-48 months	<6 months: 212 6-11 months: 180 12-17 months: 156 >months: 8	-	WHO	WHO	-	Sweet consumption: <3times/week: 33 4-6 times/week: 249 7-9 times;week: 198 >10 times/week: 76	Brushing frequency: None: 5 Not every day: 256 Every day: 240	Full breastfeeding: <6 months: 212 6-11: 180 12-17: 156 >18 months: 8	-	<6 months: RR 1.0 6-11 months: RR 0.77 CI:0.63,0.93 12-17 months: RR 0.93 CI: 0.77-1.12 >18 months: RR 0.67 CI: 0.40-1.11	In conclusion, this prospective study suggests the benefit of full breastfeeding for 6–11 months for dental caries prevention in primary teeth. There was no association be-tween the duration of any breastfeeding and dental caries. Prolonged breastfeeding was not associated with dental caries in this population.
Nunes et al., 2012	Brazil	Cohort	260	-	-	18-42 months	-	-	WHO	DMFT 0.8 (+-1.7)	Bottle-feeding: 0=186 1=48 2 or more times=7	Daily sucrose consumption between main meals 0=24 1=45 2=76 3 or more times=96	-	-	-	IRR 1.15 CI: 0.84-1.59	The present results showed that prolonged breast-feeding was not a risk factor for ECC after adjustment for a handful of important confounders. Age, sucrose consumption between main meals, and quality of oral hygiene were associated with ECC in a low-income population, using a hierarchical analysis.
Peres et al., 2017	Brazil	Cohort	1128	-	4 years	36-48 months	0-12 months: 741 13-23 months: 129	-	-	DMFS: 4.05; SD: 7.38	-	-	-	-	-	Mean ratio: > 12 months: 1.0 13-23 months: 0.9	Breastfeeding for ≥24 months increases the risk of having S-ECC. We suggest adopting measures to prevent dental

							>24 months: 258									CI: 0.6-1.3 >24 months or beyound: 1.9 CI: 1.5-2.4	caries in childhood as early as possible, because breastfeeding is beneficial for children's health.
Pires et al., 2020	Brazil	Retrospective cohort	310	Male: 159 Female:151	-	0-36 months	<9 months:159 > 9 months: 151	-	-	DMFT index: ≤2: 165 >2: 145	Yes: 196 No:114	Yes:219 No: 84	Toothbrushing frequency: Once a day: 105 Two times a day or more: 76	-	-	≤9 months: OR 1.00 ≥9 months: OR 0.38 CI: 0.21-0.68	A higher caries experience in early childhood is not associated to child's daytime caring person. On the other hand, the higher caries experience is associated with low caregiver schooling and older children.
Sæthre, Wang & Wigen, 2023.	Norway	Cohort	1088	Male:583 Female:505	5 years	-	Stop 6 months: 241 Stop 8 months: 167 Stop: 11 months: 241 Stop: 14 months: 238 Stop 18 months: 174	-	-	-	Breastmilk: 64 Sugary drink or milk: 113	Less than once a week 529 Once a week or more often: 525	twice daily: 588 Less than twice daily: 527	-	-	6 months: OR 1.3 CI: 0.5-3.1 8 months: OR 1.4 CI: 0.6-3.5 11 months: OR 0.8 CI: 0.3-2.1 14 months: OR 1.3 CI: 0.5-3.3 18 months: OR 1.00	There was no association between breastfeeding up to 18 months of age and caries development during preschool age. Caries prevalence at 5years of age was associated with high frequency of sugar intake and a low frequency of tooth brushing with fluoride toothpaste.
Sritangsirikul et al., 2024	Thailand	Cohort	486	Male: 244 Female: 242	2 years	0-36 months	Duration of full breastfeeding < 6 months: 219	-	WHO	-	Never: < 6 months: 60 6–11 months: 64	Number of meals: 1–2 meals: < 6 months: 84	Toothbrushing: Never < 6 months: 42	-	-	Full breastfeeding: < 6 months: RR 1.0 6–11 months: RR 0.78	In conclusion, our findings support the value of continued breastfeeding throughout the first year of life and

6–11 months: 166 12–17 months: 75 ≥ 18 months: 26 Duration of any breastfeeding < 6 months: 205 6–11 months: 129 12–17 months: 64 ≥ 18 months: 88	12–17 months: 23 ≥ 18 months: 5 1–3 times/week: < 6 months: 46 6–11 months: 38 12–17 months: 14 ≥ 18 months: 3 > 3 times/week: < 6 months: 113 6–11 months: 64 12–17 months: 38 ≥ 18 months: 18	6–11 months: 56 12–17 months: 16 ≥ 18 months: 2 ≥ 3 meals: < 6 months: 135 6–11 months: 110 12–17 months: 59 ≥ 18 months: 24 Sugar consumption between meals: ≤ 3 times/week: < 6 months: 78 6–11 months: 53 12–17 months: 22 ≥ 18 months: 8 4–6 times/week: < 6 months: 51 6–11 months: 47 12–17 months: 21 ≥ 18 months: 9 ≥ 7 times/week: < 6 months: 90 6–11 months: 66	6–11 months: 18 12–17 months: 11 ≥ 18 months: 4 < 2 times/day: < 6 months: 90 6–11 months: 63 12–17 months: 28 ≥ 18 months: 4 ≥ 2 times/day: < 6 months: 87 6–11 months: 85 12–17 months: 36 ≥ 18 months: 18 Fluoride toothpaste - Yes: < 6 months: 44 6–11 months: 40 12–17 months: 20 ≥ 18 months: 11 Fluoride toothpaste - No: < 6 months: 175 6–11 months: 126 12–17 months: 55	CI: 0.64-0.94 12–17 months: RR 0.79 CI: 0.62-1.02 ≥ 18 months: RR 0.94 CI: 0.77-1.13 Any breastfeeding: < 6 months: RR 1.0 6–11 months: RR 0.93 CI: 0.77-1.12 12–17 months: RR 1.1 CI: 0.85-1.43 ≥ 18 months: RR. 1.45 CI: 1.31-1.60	beyond, as recommended by leading organizations. A longer duration of full breastfeeding can protect against early childhood caries. However, any breastfeeding (with or without formula milk) for ≥ 18 months increases the caries prevalence. Therefore, breastfeeding practices should be strongly encouraged, along with urging caregivers to provide proper oral hygiene and dietary practices for children.

												12–17 months: 32 ≥ 18 months: 9	≥ 18 months: 15				
Tada et al., 1999	Japan	Cohort	392	Male: 215 Female: 177	3 years	24-36 months: 392	-	-	WHO	DMFT All teeth 18 months: 0.21±0.87 36 months: 1.81±3.12	-	Sweet foods No: 259 Yes: 133 Sweet beverages No: 139 Yes: 253	Frequency of toothbrusinh: Under once/day: 94 Once/day: 222 Over/twice day: 74	-	-	18 months: OR 1.00 36 months: OR 6.65 CI: 2.89-15.20	In conclusion, our data on dental caries occurrence and caries risk factors of infants indicate that bottle feeding and breast feeding were related to the increment of the DMFT from 18 months of age to three years old. This calls for dental health education with in-struction on milk feeding before the 18-month-old check-up
Tashiro et al. 2021	Japan	Cohort	387	Male: 200 Female: 187	2 years	24-36 months	18 months: Yes:110 No: 231	18 months Yes: 35 No: 306	-	-	-	Sweet beverage intake ≥4 times/week: 102 < 4 times/week: 238	Frequency of tooth brushing by parents ≥twice/day: 96 < twice/day: 245	-	-	18 months: OR: 7.106 CI: 2.857-19.455	In conclusion, the present results showed that prolonged breastfeeding was a risk factor for ECC at 18 months of age after adjustment for a number of important confounding factors. A close association was also demonstrated between quality of oral hygiene and ECC at 18 months and 3 years of age. Children brought in for regular examination and

																	consultation under the oral care program from 12 months of age were less likely to develop ECC at 18 months and 3 years of age.
Yokoi et al. 2021	Japan	Cohort	640	-	18 months	24-36 months: 640	>18 months: 178	> 18 months: 66	WHO	-	-	3 times a day= 126	Yes: 537 No: 103	-	-	>18 months: OR 1.71 CI: 1.15-2.55	In conclusion, receiving daytime care at a nursery school, prolonged breastfeeding, and a high frequency of snacking were significantly associated with ECC risk in Japanese toddlers.

*Decay-missing-filled teeth index. (-) Not reported. OD – Odds Ratio. RR – Risk Ratio. PR – Prevalence Ratio. IRR - Incidence rate ratio. WHO – World Health Organization. CI - confidence interval.

Risco de viés nos estudos

Entre os estudos de coorte selecionados, a principal preocupação em relação ao risco de viés foi a pergunta: "Foram declaradas estratégias para lidar com fatores de confusão?" Muitos estudos não descreveram como gerenciaram o impacto de dietas cariogênicas e hábitos de higiene bucal na avaliação do risco de cárie precoce na infância em amostras de amamentação prolongada (Bernabé et al., 2016; Blanco et al., 2021; Chaffee et al., 2014). A pergunta "Foram utilizadas estratégias para lidar com o acompanhamento incompleto?" foi considerada não aplicável na maioria dos estudos, uma vez que envolveram predominantemente participantes com acompanhamento completo. Portanto, não houve discrepâncias significativas nos períodos de acompanhamento entre os participantes. No geral, a maioria dos estudos foi considerada como tendo um risco de viés "baixo", com 7 coortes classificadas como "incertas". Informações completas sobre o risco de viés são apresentadas nas Figuras 3 e 4 e no Apêndice 3.

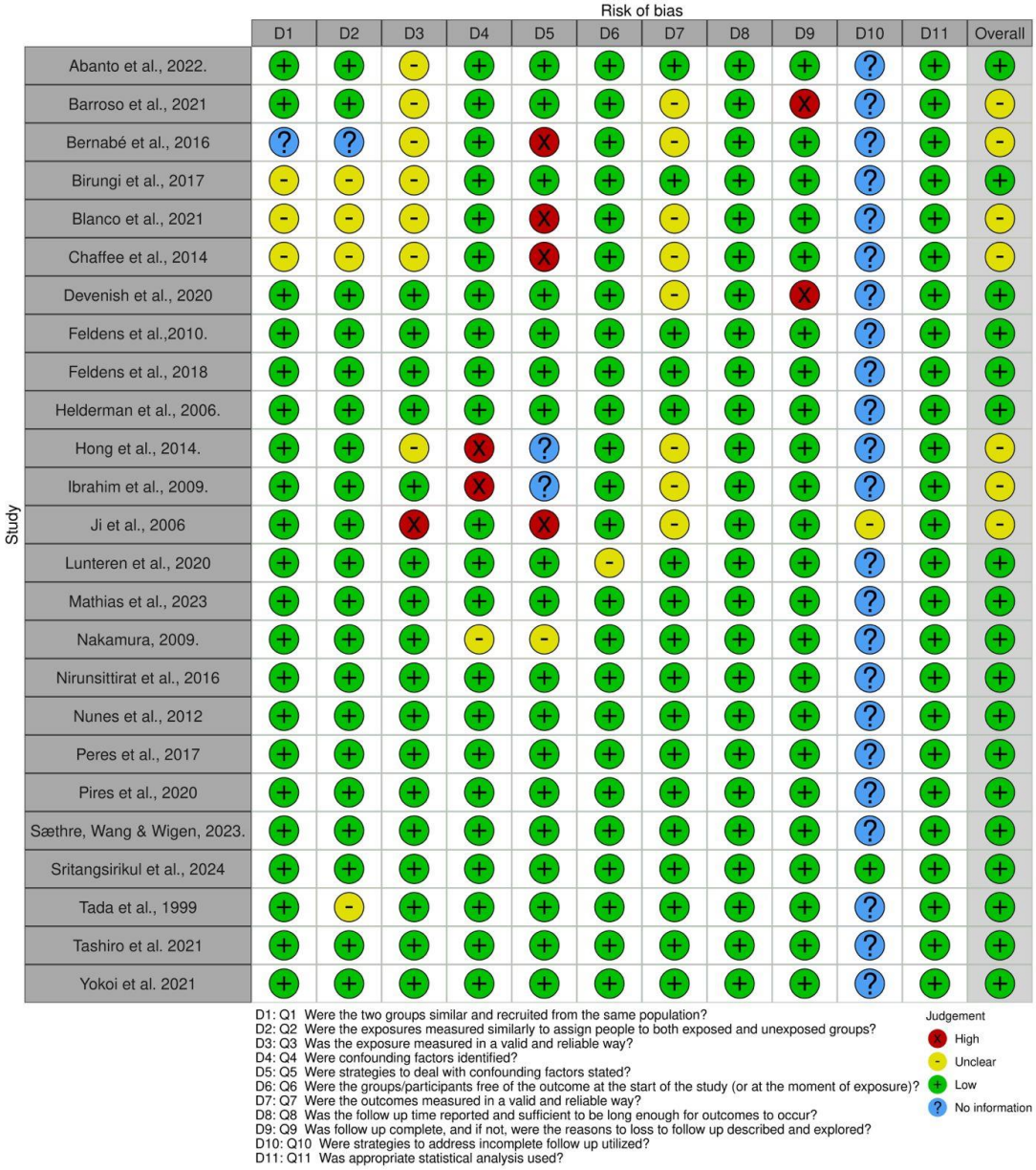


Figura 3. Gráfico de semáforo da avaliação do risco de viés dos estudos de coortes utilizando a Lista de Verificação de Avaliação Crítica do Joanna Briggs Institute para estudos de coorte.

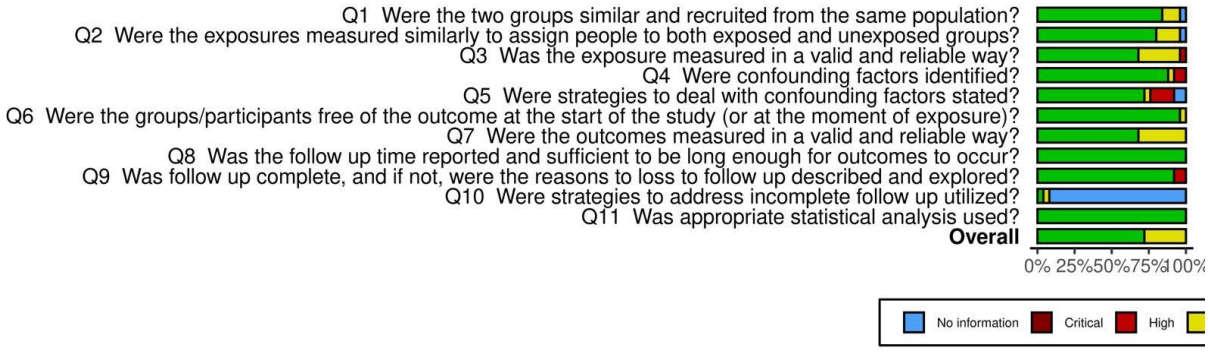


Figura 4. Gráfico de barras ponderadas mostrando a distribuição dos julgamentos de risco de viés em cada domínio, utilizando a Lista de Verificação de Avaliação Crítica do Joanna Briggs Institute para estudos de coorte.

Síntese dos resultados

Alguns estudos primários não incluíram os dados brutos necessários para gerar tabelas de contingência para o cálculo das razões de chances (OR), mesmo naqueles que utilizaram risco relativo (RR). Portanto, foram realizadas metanálises distintas de RR e CPI em aleitamento materno prolongado usando modelos de efeitos aleatórios. Para a análise de subgrupos, a metanálise foi dividida em duração do aleitamento materno de 12 a 24 meses e superior a 24 meses, por serem as categorias mais relatadas nos estudos.

O risco de CPI aumentou significativamente em crianças amamentadas por mais de 24 meses (RR = 2,44; IC 95%, 1,97 a 3,02; I^2 = 0%; P = 0,77; Figura 5), com base nas evidências agrupadas de duas coortes. Para o período de 12 a 24 meses, não houve aumento significativo no risco de CPI (RR = 1,21; IC 95%, 0,82 a 1,78; I^2 = 89%; P = 0,00001; Figura 5). No entanto, a análise de sensibilidade revelou o impacto do estudo de Feldens et al. (2010) sobre o risco geral de CPI relacionado ao aleitamento materno por mais de 12 meses.

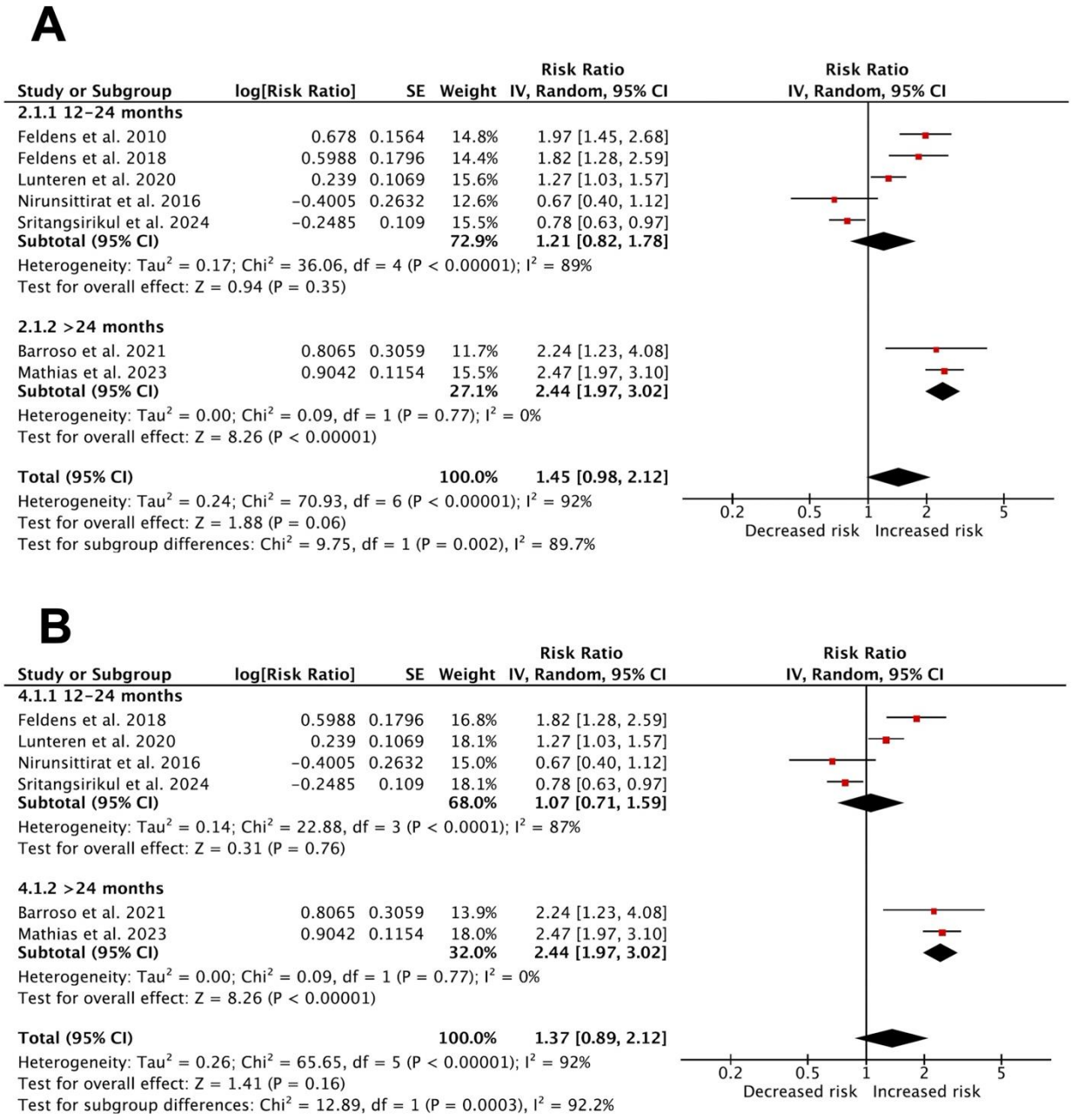


Figura 5. Gráfico de floresta em (A) exibindo o risco relativo (RR) geral de Cárie Precoce na Infância (CPI) em crianças expostas à amamentação prolongada (>12 meses). Em (B), o RR geral de CPI associado à amamentação por mais de 12 meses destaca os resultados da análise de sensibilidade.

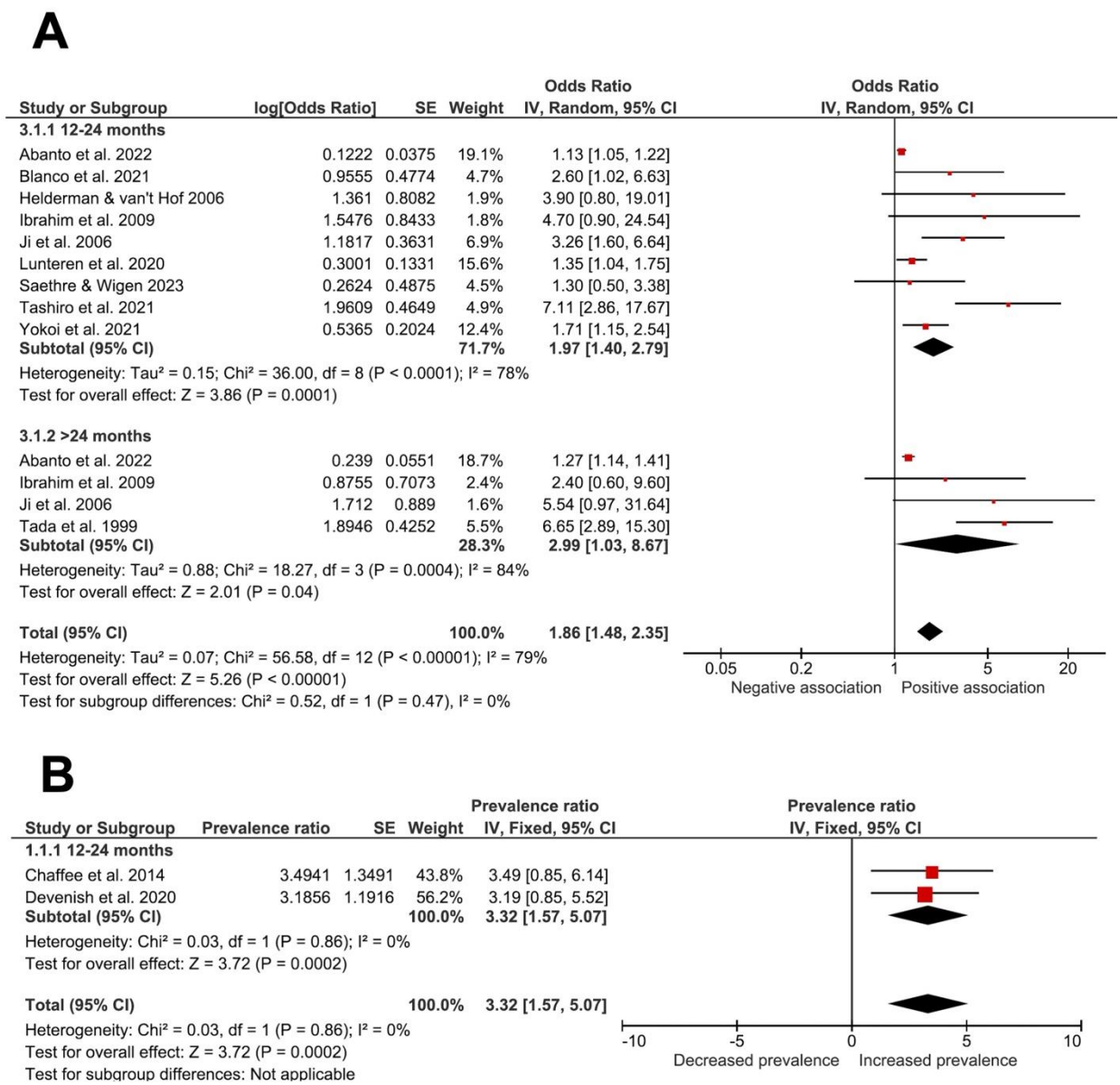


Figura 6. Gráfico de floresta apresentando a prevalência de Cárie Precoce na Infância (CPI) em crianças expostas à amamentação prolongada (>12 meses). Em (A), os dados são apresentados em razão de chances (OR), e em (B), são apresentados em razão de prevalência (RP).

As metanálises de prevalência revelaram um aumento geral da prevalência de CPI em crianças amamentadas por mais de 12 meses (OR = 1,86; IC 95%, 1,48 a 2,35; I^2 = 79%; P = 0,00001; Figura 6) e aumento da prevalência de CPI para aleitamento materno por mais de 24 meses (OR = 2,99; IC 95%, 1,03 a 8,67; I^2 = 84%; P = 0,0004; Figura 6).

Em relação à razão de prevalência, a prevalência combinada de 2 coortes mostrou um aumento da prevalência de CPI entre 12-24 meses de aleitamento materno (RP = 3,32; IC 95%, 1,57 a 5,07; I^2 = 0%; P = 0,0002; Figura 6).

Alguns estudos primários não incluíram os dados brutos necessários para gerar tabelas de contingência para o cálculo das razões de chances, mesmo naqueles que utilizaram risco relativo (RR) (refs). Cinco estudos foram excluídos da meta-análise por razões específicas: três não incluíram dados sobre crianças com mais de 12 meses (Bernabé et al., 2016; Hong et al., 2014; Pires et al., 2020); um não separou precisamente a duração da amamentação de 12-24 meses de mais de 24 meses (Nakamura et al., 2009); e um usou "razão média" como medida de efeito (Peres et al., 2017).

Viés de publicação

Figura 7 mostra os gráficos de funil dos estudos incluídos na meta-análise. Uma inspeção visual dos gráficos sugeriu que o viés de publicação é improvável. Como foram incluídos menos de 10 estudos para cada meta-análise, testes estatísticos para assimetria dos gráficos de funil não foram realizados.

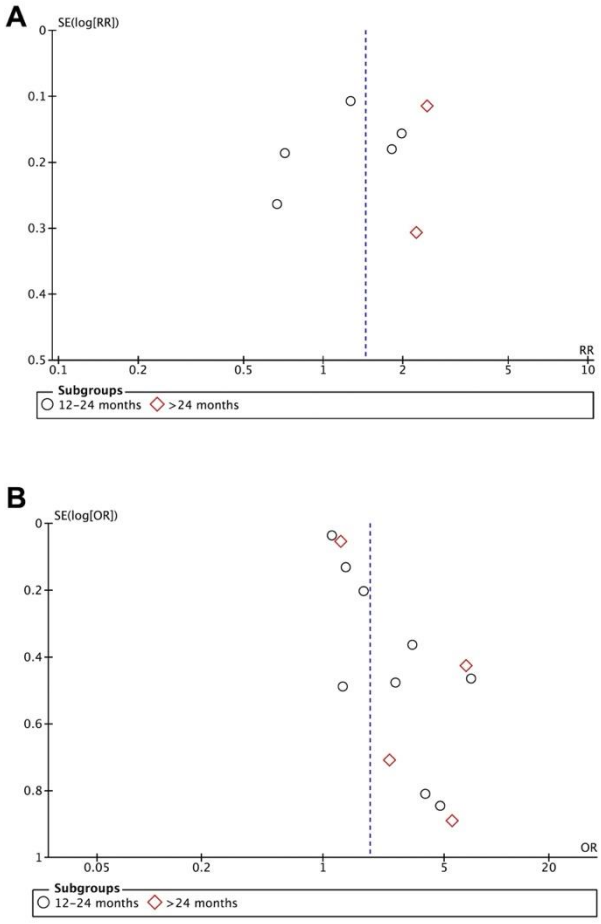


Figura 7. Gráfico de funil gerado para avaliar o possível viés de publicação. A figura (A) exibe os estudos em termos de risco relativo, enquanto a figura (B) mostra os estudos de prevalência.

Certeza da evidência

A evidência cumulativa foi avaliada usando os critérios GRADE com base no desfecho primário, "Risco de desenvolver CPI associado à amamentação prolongada." A evidência geral dos estudos de coorte foi considerada baixa, com preocupações em vários domínios: desenho do estudo (muito sério), pois todos os estudos eram estudos de coorte observacionais; e inconsistência (sério), devido à heterogeneidade significativa entre os estudos, embora a análise de sensibilidade não tenha influenciado essa heterogeneidade. Os seguintes domínios não foram considerados sérios: risco de viés, pois nenhum dos estudos foi classificado como tendo alto risco de viés; indireta, uma vez que o desfecho primário dos estudos selecionados correspondia ao desfecho desejável desta revisão sistemática; e imprecisão, devido ao tamanho substancial das amostras, com mais de 300 participantes por desfecho. A classificação da evidência foi elevada devido a um gradiente significativo de dose-resposta encontrado nos resultados combinados.

5.Discussão

A presente revisão investigou por meio de estudos de coorte o risco de cárie dentária em crianças associada ao aleitamento materno prolongado. A OMS e demais autoridades de saúde sugerem que bebês sejam amamentados de forma exclusiva até os seis meses de idade (26 semanas), seguindo posteriormente a amamentação até os dois anos ou mais (Barroso *et al.*, 2021). Dessa forma há uma preocupação em relação ao surgimento de cárie numa amamentação prolongada (Abanto *et al.*, 2022).

O levantamento apontou que os critérios de diagnóstico desenvolvido pela OMS se tornaram o padrão ouro para diagnósticos em cárie, inclusive para crianças que amamentam. No documento detalhado que se encontra atualmente em sua 5ª edição explora desde levantamentos epidemiológicos até a própria obtenção de assistência. Sua importância reflete, nessa pesquisa, sua inserção na maioria das metodologias dos pesquisadores (Abanto et al., 2022; Birungi et al., 2017; Chaffee et al., 2014; Devenish et al., 2020; Feldens et al., 2010; Feldens et al., 2018; Hong et al., 2014; Nakamura, 2009; Nirunsittirat et al., 2016; Nunes et al., 2012; Sritangsirikul et al., 2024; Tada et al., 1999; Yokoi et al., 2021).

Observa-se por meio dos dados coletados que a maioria dos estudos se concentram entre países em desenvolvimento, Tailandia (n=15) e Brasil (n=10). Um estudo demonstrou que apesar do Brasil ser o único com um sistema de atenção à saúde bucal para seus habitantes, o qual funciona na forma pública, universal e em distintos níveis de atenção, houve uma redução de cárie não tratadas de 38,17% em 1990 para 37,46% em 2017 (Crescente *et al.*, 2022).

Houveram associação direta com alimentação ou amamentação noturna com o aparecimento de cárie precoce na infância, as metánalises de prevalência revelaram um aumento geral da prevalência de CPI em crianças amamentadas por mais de 12 meses e aumento da prevalência de CPI para aleitamento materno por mais de 24 meses, sendo que, o risco de CPI aumentou significativamente em crianças amamentadas por mais de 24 meses (RR = 2,44; IC 95%, 1,97 a 3,02; I^2 = 0%; P = 0,77; Figura 5), com base nas evidências agrupadas de duas coortes. Para o período de 12 a 24 meses, não houve aumento significativo no risco de CPI (RR = 1,21; IC 95%, 0,82 a 1,78; I^2 = 89%; P = 0,00001; Figura 5). Em suma, os resultados mostraram que o risco de cárie precoce na infância é 3 vezes maior em crianças amamentadas por mais de 24 meses com leite materno.

Dessa forma, continua sendo predominante a ligação entre alimentos ricos em açúcar com a condição (Chaffee et al., 2014; Abanto et al., 2022; Barroso et al., 2021; Feldens et al., 2010; Feldens et al., 2018; Lunteren et al., 2020; Nirunsittirat et al., 2016; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Birungi et al., 2017).

Por meio do levantamento pode-se associar que o mais importante é que, apesar de existir uma dieta cariogênica por alimentos açucarados, é importante que sejam estabelecidos hábitos de higiene ao longo do dia, como os mais citados nos estudos, como a escovação, principalmente antes de dormir (Abanto et al., 2022; Hong et al., 2014; Mathias et al., 2023; Nirunsittirat et al., 2016; Pires et al., 2020; Sæthre, Wang & Wigen, 2023; Tada et al., 1999; Tashiro et al., 2021; Sritangsirikul et al., 2024).

Isso pode levar a hipótese que famílias com baixa escolaridade precisam de mais atenção para manutenção dos hábitos de escovação, uma vez que na própria escola essas práticas são ensinadas diariamente na fase infantil (Feldens *et al*., 2010).

6.CONCLUSÃO

Os achados indicaram uma correlação significativa em relação aos períodos prolongados de amamentação e uma elevação do risco de cárie dentária. Apesar da amamentação seja amplamente recomendada devido aos inúmeros benefícios para a saúde infantil, o resultado leva a necessidade de uma atenção especial a higiene oral, especialmente nas crianças que continuam a ser amamentadas além do primeiro ano de vida. Ficou evidente também a importância da higiene bucal por meio da escovação, método mais presente e pesquisado. Futuras pesquisas são necessárias para explorar intervenções eficazes que possam hamonizar os benefícios da amamentação prolongada com a saúde bucal ideal.

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ANEXO 1 - Recomendações do PRISMA Statement (Preferred Reporting Items for Stystematic Review and Meta-analyses) (PAGE et al., 2020).

Tabela 1 – Itens da lista de checagem PRISMA 2020

Seção e tópico	Item	Item da lista de checagem	Localização do item relatado
Título			
Título	1	Identifique a publicação como uma revisão sistemática.	
Resumo			
Resumo	2	Veja a lista de checagem PRISMA 2020 para Resumos.	
Introdução			
Justificativa	3	Descreva a justificativa da revisão no contexto do que já é conhecido.	
Objetivos	4	Apresente uma afirmação explícita dos objetivos ou questões abordadas pela revisão.	
Métodos			
Critérios de elegibilidade	5	Especifique critérios de inclusão e exclusão da revisão e como os estudos foram agrupados nas sumarizações.	
Fontes de informação	6	Especifique todas as bases de dados, repositórios de registros, *sites*, organizações, listas de referências e outras fontes pesquisadas ou consultadas para identificar estudos. Especifique a data em que cada fonte foi pesquisada ou consultada pela última vez.	
Estratégia de busca	7	Apresente as estratégias de busca completas para todas as bases de dados, repositórios de registros e *sites*, incluindo filtros ou limites usados.	
Processo de seleção	8	Especifique os métodos usados para decidir se um estudo atendeu aos critérios de inclusão da revisão, incluindo quantos revisores selecionaram cada registro e publicação recuperados, se trabalharam de forma independente e, se aplicável, detalhes de ferramentas de automação utilizadas no processo.	
Processo de coleta de dados	9	Especifique os métodos usados para coletar dados das publicações, incluindo quantos revisores coletaram dados de cada publicação, se eles trabalharam de forma independente, quaisquer processos para obter ou confirmar dados com os autores do estudo e, se aplicável, detalhes de ferramentas de automação utilizadas no processo.	
Lista de dados	10a	Liste e defina todos os desfechos cujos dados foram coletados. Especifique se foram coletados de cada estudo todos os resultados compatíveis com cada domínio de desfecho (ex.: para todas as medidas, ponto de tempo, análises), e se não, quais os métodos usados para decidir quais resultados coletar.	
	10b	Liste e defina todas as outras variáveis cujos dados foram coletados (ex.: características dos participantes e da intervenção, fontes de financiamento). Descreva pressupostos adotados para casos de informações faltantes ou pouco claras.	

Continua

Continuação

Tabela 1 – Itens da lista de checagem PRISMA 2020

Seção e tópico	Item	Item da lista de checagem	Localização do item relatado
Avaliação do risco de viés dos estudos	11	Especifique os métodos usados para avaliar o risco de viés nos estudos incluídos, incluindo detalhes da(s) ferramenta(s) usada(s), quantos revisores avaliaram cada estudo e se trabalharam de forma independente e, se aplicável, detalhes de ferramentas de automação usadas no processo.	
Medidas de efeito	12	Especifique para cada desfecho a(s) medida(s) de efeito (ex.: risco relativo, diferença de médias) usadas na sumarização ou apresentação dos resultados.	
Métodos de síntese	13a	Descreva os processos usados para decidir quais estudos foram elegíveis para cada síntese (ex.: tabulação das características da intervenção do estudo e comparação com os grupos planejados para cada sumarização (item 5)).	
	13b	Descreva métodos demandados para preparar os dados para apresentação ou síntese, como manejo de dados faltantes nas estatísticas de sumarização ou conversões de dados.	
	13c	Descreva métodos usados para tabular ou ilustrar visualmente os resultados de estudos individuais e sínteses.	
	13d	Descreva métodos usados para sumarizar os resultados e apresente justificativa para a(s) escolha(s). Se uma meta-análise foi realizada, descreva o(s) modelo(s), método(s) para identificar a presença e extensão da heterogeneidade estatística e o(s) pacote(s) de *software* utilizado(s).	
	13e	Descreva métodos usados para explorar as possíveis causas de heterogeneidade entre os resultados dos estudos (ex.: análise de subgrupo, metarregressão).	
	13f	Descreva análises de sensibilidade conduzidas para avaliar a robustez dos resultados sumarizados.	
Avaliação de vieses de publicação	14	Descreva métodos usados para avaliar o risco de viés devido a resultados faltantes em uma sumarização (decorrente de vieses de publicação).	
Avaliação da certeza	15	Descreva métodos usados para avaliar a certeza (ou confiança) no corpo de evidências de um desfecho.	
Resultados			
Seleção dos estudos	16a	Descreva os resultados do processo de busca e seleção, desde o número de registros identificados na busca até o número de estudos incluídos na revisão, idealmente por meio de um fluxograma.	
	16b	Cite estudos que parecem cumprir os critérios de inclusão, mas que foram excluídos e explique por que foram excluídos.	
Características dos estudos	17	Cite cada estudo incluído e apresente suas características.	
Risco de viés nos estudos	18	Apresente as avaliações do risco de viés de cada estudo incluído.	

Continua

Continuação

Tabela 1 – Itens da lista de checagem PRISMA 2020

Seção e tópico	Item	Item da lista de checagem	Localização do item relatado
Resultados de estudos individuais	19	Para todos os desfechos, apresente para cada estudo: (a) estatística sumária para cada grupo (quando apropriado) e (b) estimativa de efeito e sua precisão (ex.: intervalo de confiança/credibilidade), idealmente utilizando tabelas estruturadas ou gráficos.	
Resultados das sínteses	20a	Para cada síntese, resuma brevemente as características e o risco de viés entre os estudos contribuintes.	
	20b	Apresente os resultados de todas as sumarizações estatísticas realizadas. Se meta-análises foram feitas, apresente para cada uma a estimativa resumida e sua precisão (por exemplo, intervalo de confiança/credibilidade) e medidas de heterogeneidade estatística. Se estiver comparando grupos, descreva a direção do efeito.	
	20c	Apresente os resultados de todas as investigações das possíveis causas de heterogeneidade entre os resultados do estudo.	
	20d	Apresente os resultados de todas as análises de sensibilidade conduzidas para avaliar a robustez dos resultados sumarizados.	
Vieses de publicação	21	Apresente avaliações de risco de viés devido a resultados faltantes (decorrentes de vieses de publicação) para cada sumarização avaliada.	
Certeza da evidência	22	Apresente avaliações da certeza (ou confiança) no corpo de evidências para cada desfecho avaliado.	
Discussão			
Discussão	23a	Forneça uma interpretação geral dos resultados no contexto de outras evidências.	
	23b	Discuta limitações das evidências incluídas na revisão.	
	23c	Discuta limitações dos processos empregados na revisão.	
	23d	Discuta as implicações dos resultados para a prática, política e pesquisas futuras.	
Outras informações			
Registro e protocolo	24a	Forneça informações de registro da revisão, incluindo o nome do repositório e o número de registro, ou declare que a revisão não foi registrada.	
	24b	Indique onde o protocolo de revisão pode ser acessado ou indique se o protocolo não foi preparado.	
	24c	Descreva e explique quaisquer alterações nas informações fornecidas no registro ou no protocolo.	
Apoio	25	Descreva as fontes de apoio financeiro ou não financeiro para a revisão e o papel dos financiadores ou patrocinadores na revisão.	

Continua

Continuação

Tabela 1 – Itens da lista de checagem PRISMA 2020

Seção e tópico	Item	Item da lista de checagem	Localização do item relatado
Conflito de interesses	26	Declare quaisquer conflitos de interesse dos autores da revisão.	
Disponibilidade de dados, código e outros materiais	27	Relate quais dos itens a seguir estão disponíveis publicamente e onde podem ser encontrados: modelos de formulários para coleta de dados; dados extraídos dos estudos incluídos; dados usados para todas as análises; comando analítico; outros materiais usados na revisão.	

Tabela 2 – Lista de checagem PRISMA 2020 para resumos[a]

Seção e tópico	Item	Item da lista de checagem
Título		
Título	1	Identifique a publicação como revisão sistemática.
Introdução		
Objetivos	2	Forneça uma declaração explícita dos objetivos ou perguntas principais que a revisão aborda.
Métodos		
Critérios de elegibilidade	3	Especifique os critérios de inclusão e exclusão da revisão.
Fontes de informações	4	Especifique as fontes de informação (ex.: bases de dados, repositórios) usadas para identificar os estudos e a data em que cada um foi pesquisado pela última vez.
Risco de viés	5	Especifique os métodos usados para avaliar o risco de viés nos estudos incluídos.
Síntese dos resultados	6	Especifique os métodos usados para apresentar e sintetizar os resultados.
Resultados		
Estudos incluídos	7	Apresente o número total de estudos incluídos e participantes e resuma as características relevantes dos estudos.
Síntese dos resultados	8	Apresente os resultados para os desfechos primários, de preferência indicando o número de estudos incluídos e participantes de cada. Se meta-análise foi feita, relate a estimativa sumária e o intervalo de confiança/credibilidade. Se estiver comparando grupos, indique a direção do efeito (ou seja, qual grupo é favorecido).
Seção e tópico	**Item**	**Item da lista de checagem**
Discussão		
Limitações das evidências	9	Forneça um breve resumo das limitações das evidências incluídas na revisão (ex.: risco de viés dos estudos, inconsistência e imprecisão).
Interpretação	10	Forneça uma interpretação geral dos resultados e implicações relevantes.
Outros		
Financiamento	11	Especifique a fonte primária de financiamento da revisão.
Registro	12	Informe o repositório e o número de registro.

a) Esta lista de checagem de resumos mantém os mesmos itens incluídos na declaração PRISMA para resumos publicada em 2013[14] mas foi revisada para tornar o texto consistente com a declaração PRISMA 2020 e inclui um novo item recomendando aos autores especificar os métodos usados para apresentar e sintetizar os resultados (item 6).

APÊNDICE 1

Appendix 1 - Databases and search strategies.

Database	Search strategy	Resul May 1 2024
Medline / PubMed	("Breast Feeding"[MeSH Terms] OR "Breast Feeding"[All Fields] OR "Breastfed"[All Fields] OR "Breastfeeding"[All Fields] OR "Breast Fed"[All Fields] OR "Milk Sharing"[All Fields] OR "Exclusive Breast Feeding"[All Fields] OR "Exclusive Breastfeeding"[All Fields] OR "Wet Nursing"[All Fields] OR "sharing milk"[All Fields] OR "breast feeding exclusive"[All Fields] OR "breastfeeding exclusive"[All Fields] OR "Lactation"[MeSH Terms] OR "Lactation"[All Fields] OR "lactations"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Prolonged Lactation"[All Fields] OR "Prolonged Lactations"[All Fields] OR "Prolonged breast feeding"[All Fields] OR "Prolonged breastfeeding"[All Fields] OR "lactation prolonged"[All Fields] OR "milk, human"[MeSH Terms] OR "Breast Milk"[All Fields] OR "Human Milk"[All Fields] OR "milk breast"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Bottle Feeding"[MeSH Terms] OR "Bottle Feeding"[All Fields] OR "Bottlefeeding"[All Fields] OR "Bottlefed"[All Fields]) AND ("Dental Caries"[MeSH Terms] OR "Dental Caries"[All Fields] OR "Dental Cavity"[All Fields] OR "Dental Decay"[All Fields] OR "Dental Cavities"[All Fields] OR "Carious Lesions"[All Fields] OR "Carious Lesion"[All Fields] OR "Carious Dentin"[All Fields] OR "Dental White Spot"[All Fields] OR "Dental White Spots"[All Fields] OR "caries dental"[All Fields] OR "cavities dental"[All Fields] OR "cavity dental"[All Fields] OR "lesions carious"[All Fields] OR "decay dental"[All Fields] OR "dentin carious"[All Fields] OR "white spot dental"[All Fields] OR "Early childhood caries"[All Fields] OR "Tooth Demineralization"[MeSH Terms] OR "Tooth Demineralization"[All Fields])	978
Embase	('breast feeding'/de OR 'breast feeding' OR breastfed OR 'breastfeeding'/de OR breastfeeding OR 'breast fed' OR 'milk sharing' OR 'exclusive breast feeding'/de OR 'exclusive breast feeding' OR 'exclusive breastfeeding'/de OR 'exclusive breastfeeding' OR 'wet nursing' OR 'sharing milk' OR 'breast feeding exclusive' OR 'breastfeeding exclusive' OR 'lactation'/de OR lactation OR lactations OR 'prolonged lactation'/de OR 'prolonged lactation' OR 'prolonged lactations' OR 'prolonged breast feeding' OR 'prolonged breastfeeding' OR 'lactation prolonged'/de OR 'lactation prolonged' OR 'breast milk'/de OR 'breast milk' OR 'human milk'/de OR 'human milk' OR 'milk breast' OR 'milk secretion'/de OR 'milk secretion' OR 'milk secretions' OR 'bottle feeding'/de OR 'bottle feeding' OR bottlefeeding OR bottlefed) AND ('dental caries'/de OR 'dental caries' OR 'dental cavity' OR 'dental decay'/de OR 'dental decay' OR 'dental cavities'/de OR 'dental cavities' OR 'carious lesions' OR 'carious lesion' OR 'carious dentin' OR 'dental white spot' OR 'dental white spots' OR 'caries dental'/de OR 'caries dental' OR 'cavities dental' OR 'cavity dental' OR 'lesions carious' OR 'decay dental' OR 'dentin carious' OR 'white spot dental' OR 'early childhood caries'/de OR 'early childhood caries' OR 'tooth demineralization'/de OR 'tooth demineralization')	*1,12*
Scopus	TITLE-ABS-KEY("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TITLE-ABS-KEY("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries	1,19

	dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	
Web of Science	TS=("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TS=("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	390
Cochrane Library	("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed):ti,ab,kw AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization"):ti,ab,kw	56
CINAHL (EBSCO)	(TI("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TI("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")) OR (AB("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND AB("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")) OR (SU("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk	300

	Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND SU("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization"))	
LILACS / via BVS	("Breast Feeding" OR breastfed OR breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR bottlefeeding OR bottlefed OR "Aleitamento Materno" OR aleitamento OR "Aleitamento Materno Exclusivo" OR "Alimentado ao Peito" OR "Alimentado no Peito" OR "Alimentação ao Peito" OR amamentado OR amamentação OR "Amamentação com Ama-de-Leite" OR "Compartilhamento de Leite" OR "Lactancia Materna" OR "Alimentación al Pecho" OR amamantado OR amamantamiento OR "Compartir Leche" OR "Enfermería Húmeda" OR "alimentación por nodriza" OR "compartir leche materna" OR lactação OR "Lactação Prolongada" OR "Secreção de Leite" OR "Secreções de Leite" OR lactancia OR "Lactancia Prolongada" OR "Secreciones de Leche" OR "Secreción de Leche" OR "Leite Humano" OR "Leite Materno" OR "Leche Humana" OR "Leche Materna" OR "Leche de la Madre" OR "Alimentação com Mamadeira" OR "Aleitamento por Mamadeira" OR "Alimentado por Mamadeira" OR "Alimentación con Biberón" OR "Alimentado con Biberón" OR "alimentación por biberón") AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization" OR "Cárie Dentária" OR "Cavidade Dentária" OR "Cavidades Dentárias" OR "Cárie Dental" OR caries OR "Cáries Dentais" OR "Cáries Dentárias" OR "Dente Cariado" OR "Lesões Cariosas" OR "Manchas (hipocalcificadas) Brancas Dentárias" OR "Manchas Brancas" OR "Caries Dental" OR "Caries Dentales" OR "Cavidad Dental" OR "Cavidades Dentales" OR "Lesiones Cariosas" OR "Manchas Blancas Dentales" OR "caries dentaria" OR "manchas blancas del esmalte" OR "Carious Dentins" OR "Desmineralização do Dente" OR "Desmineralização Dentária" OR "Desmineralizações dos Dentes" OR "Desmineralización Dental") AND (db:("LILACS"))	210
Bibliografia Brasileira de Odontologia (BBO) / via BVS	("Breast Feeding" OR breastfed OR breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR bottlefeeding OR bottlefed OR "Aleitamento Materno" OR aleitamento OR "Aleitamento Materno Exclusivo" OR "Alimentado ao Peito" OR "Alimentado no Peito" OR "Alimentação ao Peito" OR amamentado OR amamentação OR "Amamentação com Ama-de-Leite" OR "Compartilhamento de Leite" OR "Lactancia Materna" OR "Alimentación al Pecho" OR amamantado OR amamantamiento OR "Compartir Leche" OR "Enfermería Húmeda" OR "alimentación por nodriza" OR "compartir leche materna" OR lactação OR "Lactação Prolongada" OR "Secreção de Leite" OR "Secreções de Leite" OR lactancia OR "Lactancia Prolongada" OR "Secreciones de Leche" OR "Secreción de Leche" OR "Leite Humano" OR "Leite Materno" OR "Leche Humana" OR "Leche Materna" OR "Leche de la Madre" OR "Alimentação com Mamadeira" OR "Aleitamento por	120

	Mamadeira" OR "Alimentado por Mamadeira" OR "Alimentación con Biberón" OR "Alimentado con Biberón" OR "alimentación por biberón") AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization" OR "Cárie Dentária" OR "Cavidade Dentária" OR "Cavidades Dentárias" OR "Cárie Dental" OR caries OR "Cáries Dentais" OR "Cáries Dentárias" OR "Dente Cariado" OR "Lesões Cariosas" OR "Manchas (hipocalcificadas) Brancas Dentárias" OR "Manchas Brancas" OR "Caries Dental" OR "Caries Dentales" OR "Cavidad Dental" OR "Cavidades Dentales" OR "Lesiones Cariosas" OR "Manchas Blancas Dentales" OR "caries dentaria" OR "manchas blancas del esmalte" OR "Carious Dentins" OR "Desmineralização do Dente" OR "Desmineralização Dentária" OR "Desmineralizações dos Dentes" OR "Desmineralización Dental") AND (db:("BBO"))	
ProQuest Dissertations & Theses Global	noft("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND noft("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	36
LIVIVO	("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	480
Google Scholar	("Breast Feeding" OR Breastfeeding OR Lactation OR "Breast Milk" OR "Bottle Feeding" OR Bottlefeeding) AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities")	100

Search strategies were performed for each database by using specifics words combinations and truncations with the support of a librarian.

APÊNDICE 2. Artigos excluídos e motivos de exclusão (n=20).

Author, Year	Reason for exclusion
Beckett *et al.,* 2022	2
Bell et al., 2019	4
Boustedt et al., 2018	3
Cangussu et al., 2016	3
Chattopadhyay et al., 2020	3
Conway, 2023	6
de Sousa Cabral et al., 2017	3
Kuhn & Stadler, 2007	3
Ha et al., 2023	3
Hu et al., 2019	3
Peltzer et al., 2014	4
Lam et al., 2017	4
Mizoguchi et al., 2003	3
Nakai & Mori-Suzuki, 2022	6
Nishimura et al., 2008	6
Olatosi et al., 2021	3
Schwarz et al., 2011	4
Tiberia et al., 2007	3
Uerlich et al., 2021	3
Yonezu & Yakushiji, 2008	4

(1) children with known immunological diseases, with physical, neurological or metabolic syndromes, with chronic history of infection, or with history of preterm birth (< 36 weeks); (2) children over 71 months old; (3) other types of feeding practices; (4) absence of the comparison with prolonged bottle feeding or N/A; (5) dental hypoplasia and other dental abnormalities; (6) *in vitro* studies, animal studies, case reports, cross-sectional, case-control, randomized trial, reviews, letters, personal opinions, book chapters, and conference abstracts.

References

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APÊNDICE 3

Resultados da Lista de Verificação de Avaliação Crítica do Instituto Joanna Briggs para estudos de coorte (Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Capítulo 7: Revisões sistemáticas de etiologia e risco. Em: Aromataris E, Munn Z (Editores). Manual JBI para Síntese de Evidências. JBI, 2020. Disponível em https://synthesismanual.jbi.global).

Author, year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total ΣY	Risk of Bias
Abanto et al., 2022.	Y	Y	U	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Barroso et al., 2021	Y	Y	U	Y	Y	Y	U	Y	N	N	Y	63%	Mod
Bernabé et al., 2016	NA	NA	U	Y	N	Y	U	Y	Y	NA	Y	62%	Mod
Birungi et al., 2017	U	U	U	Y	Y	Y	Y	Y	Y	NA	Y	70%	Low
Blanco et al., 2021	U	U	U	Y	N	Y	U	Y	Y	NA	Y	50%	Mod
Chaffee et al., 2014	U	U	U	Y	N	Y	U	Y	Y	NA	Y	50%	Mod
Devenish et al., 2020	Y	Y	Y	Y	Y	Y	U	Y	N	N	Y	72%	Low
Felden et al.,2010.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Feldens et al., 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	90%	Low
Helderman et al., 2006.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Hong et al., 2014.	Y	Y	U	N	NA	Y	U	Y	Y	NA	Y	55%	Mod
Ibrahim et al., 2009.	Y	Y	Y	N	NA	Y	U	Y	Y	NA	Y	66%	Mod
Ji et al., 2006	Y	Y	N	Y	N	Y	U	Y	Y	U	Y	54%	Mod
Lunteren et al., 2020	Y	Y	Y	Y	Y	U	Y	Y	Y	NA	Y	90%	Low
Mathias et al., 2023	N	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Nakamura, 2009.	Y	Y	Y	U	U	Y	Y	Y	Y	NA	Y	70%	Low
Nirunsittirat et al., 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Nunes et al., 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Peres et al., 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Pires et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Sæthre, Wang & Wigen, 2023.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Sritangsirikul et al., 2024	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%	Low
Tada et al., 1999	Y	U	Y	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Tashiro et al. 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Yokoi et al. 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low

Y yes, *N* no, *U* unclear, *NA* not applicable

Q1. Were the two groups similar and recruited from the same population?

Q2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?
Q3. Was the exposure measured in a valid and reliable way?
Q4. Were confounding factors identified?
Q5. Were strategies to deal with confounding factors stated?
Q6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?
Q7. Were the outcomes measured in a valid and reliable way?

Q8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?
Q9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?
Q10. Were strategies to address incomplete follow up utilized?
Q11. Was appropriate statistical analysis used?

Total = ΣY/applicable items (the not applicable (NA) items were excluded from the sum)
Risk of bias (methodologic quality) was categorized as high when the study reaches up to 49% score “yes”, moderate when the study reached 50 to 69% score “yes”, and low when the study reached more than 70% score “yes”

APÊNDICE 4 – Artigo submetido ao periódico científico International Journal of Peadiatric Dentistry (Qualis CAPES A2).

Risk of Early Childhood Dental Caries associated with Prolonged Breastfeeding: A Systematic Review and Meta-analysis

Running title: Dental Caries related to Prolonged Breastfeeding

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Authors contributions:

In this study, the authors made the following contributions: K.L. and B.S.F.S. conceptualized the research design and methodology. L.R.S.R. and R.M.R. conducted data collection and analysis. T.P.P. contributed to literature review and interpretation of results. E.M. provided critical insights and revisions for intellectual content. F.P.Y.S. contributed to experimental procedures and manuscript preparation. B.S.F.S. supervised the project and ensured overall integrity and coherence of the study. All authors reviewed and approved the final manuscript.

Word count: 4.404

Risk of Early Childhood Dental Caries associated with Prolonged Breastfeeding: A Systematic Review and Meta-analysis

Abstract

Background - Breastfeeding provides essential nutrients and benefits for newborns. However, its prolonged duration has raised concerns about potential risks for early childhood caries (ECC). **Aim -** To determine if prolonged breastfeeding increases the risk of dental caries in children under 71 months. **Design -** Eligibility criteria included observational studies comparing ECC risk in children breastfed for over 12 months, with no language restrictions. Databases searched included PubMed, Scopus, and others, up to May 17, 2024. Risk of bias was assessed using the Joanna Briggs Institute Critical Appraisal Checklist. Meta-analyses were performed using random-effects model. **Results -** Twenty-five studies involving 19,681 participants were included. Studies showed an increased risk of ECC in children breastfed for more than 24 months (RR = 2.44; 95% CI, 1.97 to 3.02). For the 12-24 month period, no significant risk increase

was found (RR = 1.21; 95% CI, 0.82 to 1.78). Prevalence meta-analyses also indicated higher ECC prevalence with breastfeeding beyond 12 months (OR = 1.86; 95% CI, 1.48 to 2.35). **Conclusion -** Prolonged breastfeeding beyond 24 months is associated with an increased risk of ECC. These findings underscore the need for balanced breastfeeding guidelines and oral health interventions.

1. Introduction

Breastfeeding is recognized as a rich source of high-quality nutrients for newborns, offering a wide range of benefits for development, growth, and immunity.[1] The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend exclusive breastfeeding for the first 6 months of a child's life, followed by the introduction of appropriate complementary foods, with continued breastfeeding up to 24 months or beyond.[2,3] Despite the well-documented benefits of breastfeeding, there are concerns regarding its potential risk for dental caries. A recent birth cohort study conducted in Brazil found an association between prolonged breastfeeding and early childhood caries (ECC) at 48 months. The results suggested that breastfeeding beyond 24 months of age might have negative implications for dental health.[1]

ECC is defined as the presence of one or more decayed, missing, or filled tooth surfaces in primary teeth in children younger than 71 months (approximately 6 years).[4] ECC remains a significant health issue worldwide and is a major contributor to health inequities.[5] Several risk factors contribute to ECC, including the quality of toothbrushing, parental supervision, brushing frequency, fluoride exposure, dietary habits, and breastfeeding patterns.[6]

Regarding breastfeeding and the risk of ECC, several systematic reviews have addressed this topic over the years[7,8], presenting conflicting evidence in a context of methodological inconsistency. Valaitis et al.[7], in 2000, did not confirm a pooled relationship between ECC and breastfeeding. They observed inconsistent definitions of ECC in the included studies, lack of prospective design, and lack of control for relevant variables such as dental health practices. In 2015, Avila et al.[8], based on pooled evidence, concluded that breastfeeding can protect against ECC, with a lower risk of ECC compared to bottle-fed children. Tham et al. (2015)[9] systematically assessed the associations between breastfeeding and dental caries within specific time frames of childhood. They found that breastfeeding up to 12 months of age reduced the risk of caries, but there was an increased risk in children breastfed for more than 12 months. Cui et al.[10], in 2017, performed an analysis of case-control and cohort studies regarding the risk of ECC. They suggested that breastfeeding might protect children from ECC but could become a risk factor for ECC when the duration of breastfeeding extends beyond 12 months. The most recent meta-analysis[11], which included 9 case-

control studies and 22 cohorts, showed no statistically significant risk of ECC in children older than 12 months. It is important to note that the evidence generated by these reviews was based solely on primary studies published in English. The restriction to the English language was not justified

Despite the aforementioned evidence, there is a lack of consensus regarding prolonged breastfeeding and the risk of ECC, particularly in the context of the WHO and UNICEF recommendations for breastfeeding up to 24 months or beyond. Additionally, there is a need to update the meta-analysis with new evidence published since the last review, without imposing any language restrictions. Thus, the present systematic review aims to answer the following focused question: Does prolonged breastfeeding represent a risk for dental caries in children up to 71 months?

2. Material and methods

The systematic review (SR) protocol was developed according to the PRISMA-P (Preferred Reporting Items for Systematic Review and Meta-Analyses protocols)[12] and registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the number CRD42024509212. This SR was reported according to the PRISMA Statement (Preferred Reporting Items for Systematic Review and Meta-Analyses checklist).[13]

2.1 Eligibility criteria

The inclusion and exclusion criteria adopted in this study were structured following the acronym PECO (Population, Exposure, Comparison and Outcome), recommended for systematic reviews:[14]

P - population: Children up to 71 months

E – exposition: Prolonged breastfeeding >12 months

C – comparison: No comparator or prolonged bottle feeding

O - Outcome: Risk of dental caries

For inclusion, publications had to be observational studies published as full articles, that compare the risk or prevalence of dental caries in children (up to 71 months) who have experienced prolonged breastfeeding (> 12 months). We did not restrict the date or language of publication.[15]

The following exclusion criteria were considered: (1) children with known immunological diseases, with physical, neurological or metabolic syndromes, with chronic history of infection, or with history of preterm birth (< 36 weeks); (2) children over 71 months old; (3) different types of feeding practices as the main outcome; (4) absence of the comparison with prolonged bottle feeding or N/A; (5) dental hypoplasia and other dental abnormalities; (6) *in vitro* studies, animal studies, case reports, cross-sectional, case-control, randomized trial, reviews, letters, personal opinions, book chapters, and conference abstracts.

2.2 Information sources and Search strategy

The search was performed up to May 17th and references were extracted from 8 main electronic databases: Pubmed (Medline), Scopus, EMBASE, Latin American and Caribbean Health Sciences (LILACS)(via BVS), Web of Science, Livivo, CINAHL (EBSCO), and Cochrane Library. In addition, the grey literature was searched on Google Scholar, Proquest and Bibliografia Brasileira de Odontologia (BBO). No filters regarding language and date of publication were used. To identify the studies, terms referring to “Dental Caries”, and “Breastfeeding” were used, selected from the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH). Free terms were also selected. Strategies with specific word combination and truncation were drawn up to each database with the support of a librarian specialized in health sciences (Appendix 1). We set up alerts for newly published articles containing our search terms. Additionally, we performed a hand search in the reference lists of published reviews to find articles that might have been missed during the platform search.

2.3 Selection process

Once the articles were identified in the specified databases, all duplicates were eliminated using the Endnote 20 digital application (EndNote version 21, The EndNote Team, Philadelphia, PA, USA). The selection of studies consisted of two phases. In the 1st phase, three reviewers (K.L., L.R.S.R., and R.M.R.), initially calibrated using the first ten articles in the search, selected the studies by carefully reading the titles and abstracts using the Rayyan platform (Rayyan’s web software, Qatar Computing Research Institute, Doha, Qatar). In situations of divergence, they were revisited by an expert reviewer (B.S.F.S.). In the 2nd

phase, the same reviewers independently assessed the eligibility of the selected articles by reading the full texts. The conflicts were mediated by the same expert (BSFS). The complete selection process and reason for exclusion of the studies in phase 2 are presented in Figure 1 and Appendix 2, respectively.

2.4 Data collection process

Information from the chosen primary studies was independently extracted by the same 3 reviewers from phases 1 and 2 using a designated data extraction form that included the following: identification (author, year of publication, country, and study design); sample characteristics (total number of participants divided into sex; follow up in years; age in months; breastfeeding duration; and bottle-feeding duration); and the outcome (presence of caries; decayed, missing, filled teeth (DMFT/DMFS) index; nocturnal feeding; cariogenic diet; oral hygiene habits; breastfeeding frequency; bottle-feeding frequency; and the results as well as their adjustment variables). The detailed information extracted from the selected studies is presented in Table 1. When the data required for qualitative and/or quantitative analysis was unavailable or incomplete or could not be derived from the reported values, attempts were made to obtain this information from the corresponding authors of the studies.

2.5 Risk of bias assessment (methodologic quality)

The methodologic quality analysis of the included studies was independently performed by three reviewers (K.L., L.R.S.R., and R.M.R.), initially calibrated using five included studies, using the Joanna Briggs Institute Critical Appraisal Checklist for cohort studies.[16] An expert (B.S.F.S.) was consulted in case of disagreement between the three reviewers. Eleven items were answered with “yes,” “no,” “unclear,” or “not applicable” for each article. The risk of bias was assessed and reported separately for each study examined, and was categorized as “high”, “moderate”, and “low” when the study achieved a “yes” score of 49%, 50% to 69%, and 70%, respectively. The total not applicable (NA) items were excluded from the sum.

2.6 Effect measures

The main outcome was the association between prolonged breastfeeding and the incidence/prevalence of ECC. For data extraction, we sought to retrieve adjusted measures (relative risk (RR), odds ratio (OR), prevalence ratio (PR), and others) when they were available. In case those were not available, crude measures were extracted for data summarization.

2.7 Synthesis methods

The software Review Manager (version 5.3) was used for the meta-analysis (*Review Manager - RevMan*, Version 5.4; The Cochrane Collaboration, 2020. Available online: https://revman.cochrane.org - accessed on 15 June 2024). Heterogeneity among the studies was assessed using Cochran's Q test and the I^2 index. An I^2 index of 0–30% indicated insignificant heterogeneity, 30–50% indicated moderate heterogeneity, 50–90% indicated substantial heterogeneity, and above 90% indicated considerable heterogeneity. Depending on the degree of heterogeneity, either fixed-effect or random-effects models were employed to combine the data.[17]

Sensitivity analysis was performed excluding one study at a time, to screen for studies that might overly estimate or underestimate results. Additionally, a subgroup analysis was planned to separate the studies according to the outcome measures used, considering whether they were measures of incidence or prevalence, and whether the data were adjusted or crude. Subgroup analyses considering nocturnal breastfeeding were not performed due to the lack of information on this practice in the studies. The absence of reporting does not necessarily indicate that nocturnal breastfeeding was absent in the sample. All statistical analyses were performed at a predetermined significance level of 0.05 and 95% CIs.

2.8 Bias of publication assessment

To assess publication bias, funnel plots of the log OR/RR against their standard errors were created to visually examine funnel plot asymmetry, which indicates the presence of publication bias[18-20]. A significance level of $P < 0.05$ was applied. The software Review Manager was used for data entry and analysis.

2.9 Certainty assessment

We evaluated the certainty of evidence using the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) system. This tool comprises five domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias. The certainty level for the body of evidence is categorized as high, moderate, low, or very low. The summary of findings table was produced using the Grading of Recommendations Assessment, Development and Evaluation online software (GRADEpro GTD).[21]

3. Results

3.1 Study selection

In Phase 1, a search in 8 main electronic databases yielded 4,733 references. After removing duplicates, 2,095 references remained for the title and abstract assessment. In Phase 2, 44 studies underwent a full-text comprehensive appraisal. Applying the eligibility criteria, 24 studies remained for further analysis. An additional search in the grey literature yielded 1 more study. Further hand searches in the reference lists of the 25 included articles did not yield any additional studies. The specific reasons for exclusion in Phase 2 are presented in Appendix 2. The detailed selection process is illustrated in the selection process flow diagram in Figure 1.

3.2 Study characteristics

Out of the 25 selected studies, 8 presented incidence data on the risk of caries in prolonged breastfeeding[22-29], and 17 data in terms of odds ratio.[30-46] Most studies were from Brazil[22,25-27,30,33,40-42], followed by Japan[37,38,44-46], Thailand[28,29], and other countries represented by one study each: Scotland[31], Uganda[24], Spain[32], Australia[34], Myanmar[35], the United States[36], the Netherlands[39], and Norway[43]. The complete geographical distribution of the sample and its representation in the pooled sample are illustrated in Figure 2. These cohorts were published between 1999 and 2024, with sample sizes ranging from 132 to 4,146 participants. The pooled sample included 19,681 participants. Twelve of the 25 selected studies provided the male-to-female

proportion, resulting in a pooled proportion of 1.07:1. Most of the cohort studies reported follow-up periods ranging from 1 to 9 years.

The main criteria adopted in the studies for diagnosing dental caries was the WHO criteria[24-30,33,34,36,40,44,46]. One study adopted the International Caries Detection and Assessment System (ICDAS)[23], and 11 studies did not report the criteria adopted[22,31,32,35,37-39,41-43,45]. Nocturnal feeding was reported in 7 studies[25,27,29,35,39,42,43], with a heterogeneous mix of breastmilk, bottle milk, and sugary drinks. The cariogenic diet was assessed through the consumption of sugary products [23-26,28,30,33,39,42,43] or ultra-processed foods.[22] The frequency of cariogenic diet consumption was assessed in some studies[24,28,29,32,34,39], and the quantity in other.[32] However, 7 studies did not report the consumption of cariogenic diets.[31,35-37,40,41] Regarding oral hygiene habits, the main reports included the frequency of toothbrushing[22,28-30,36,42-45], and whether it was supervised.[23,45] Some studies only reported the presence or absence of oral hygiene habits[25,35], one analyzed the family oral hygiene index[24], while others did not report these habits at all.[26,27,31-34,37,39-41]

3.3 Risk of bias within studies

Within the selected cohort studies, a primary concern regarding bias was whether strategies to manage confounding factors were explicitly stated. Some studies did not describe how they accounted for cariogenic diets and oral hygiene habits affecting the risk of Early Childhood Caries (ECC) in prolonged breastfeeding samples.[31-33] Additionally, the question about strategies for dealing with incomplete follow-up was often deemed not applicable, as most studies had complete participant follow-up, minimizing discrepancies in follow-up periods. Overall, most studies were rated as having a "Low" risk of bias, with 7 cohorts classified as "Unclear." Detailed bias assessments are presented in Figure 3 and Appendix 3.

3.4 Synthesis of results

Some primary studies did not provide the necessary raw data to construct contingency tables for calculating OR or RR. Consequently, separate meta-analyses were conducted using random effects models. For subgroup analysis,

breastfeeding durations of 12-24 months and over 24 months were the most frequently reported categories in the studies.

The risk of ECC was significantly higher in children breastfed for more than 24 months (RR = 2.44; 95% CI, 1.97 to 3.02; I^2 = 0%; P = .77; Figure 4, A), based on pooled evidence from two cohorts. For the 12-24 month period, there was no significant increase in ECC risk (RR = 1.21; 95% CI, 0.82 to 1.78; I^2 = 89%; P = .00001; Figure 4, A). Sensitivity analysis highlighted the influence of the study by Feldens et al. (2010) on the overall risk of ECC associated with breastfeeding exceeding 12 months (Figure 4, B).

Meta-analyses indicated an overall higher prevalence of ECC in children breastfed for > 12 months (OR = 1.86; 95% CI, 1.48 to 2.35; I^2 = 79%; P = .00001; Figure 5, A), and a notably increased prevalence for those breastfed beyond 24 months (OR = 2.99; 95% CI, 1.03 to 8.67; I^2 = 84%; P = .0004; Figure 5, A). Regarding PR, pooled data from 2 cohorts showed an increased ECC prevalence between 12-24 months of breastfeeding (PR = 3.32; 95% CI, 1.57 to 5.07; I^2 = 0%; P = .0002; Figure 5, B).

Five studies were excluded from the meta-analysis for specific reasons: three lacked data on children older than 12 months despite follow-up exceeding 12 months;[31,36,42] one did not clearly distinguish breastfeeding durations of 12-24 months from over 24 months;[40] and one utilized "mean ratio" as the effect measure.[41]

3.5 Reporting biases

Figure 6 shows the funnel plots of the studies included in the meta-analysis. A visual inspection of the funnel plots suggested that publication bias was unlikely. Since fewer than 10 studies for each meta-analysis were included, statistical tests for funnel plot asymmetry were not performed.

3.6 Certainty of evidence

The cumulative evidence was assessed using the GRADE criteria based on the primary outcome, "Risk of developing ECC associated with prolonged breastfeeding." The overall evidence from cohort studies was judged to be low, with concerns in several domains: study design (very serious), as all studies were observational cohort studies; and inconsistency (serious), due to significant

heterogeneity among the studies, though the sensitivity analysis did not influence this heterogeneity. The following domains were not considered serious: risk of bias, as none of the studies were classified as having a high risk of bias; indirectness, since the primary outcome of the selected studies matched the desirable outcome of this systematic review; and imprecision, due to substantial sample sizes with more than 300 participants per outcome. The evidence classification was upgraded due to a significant dose-response gradient found in the pooled results. A detailed summary of the findings using the GRADE approach is presented in Appendix 4.

4. Discussion

To date, there is a lack of evidence on the risk of ECC associated with prolonged breastfeeding at 24 months or beyond.[9,11] This review aimed to update the evidence on breastfeeding and the risk of dental caries, focusing on the impact of prolonged breastfeeding on ECC. The pooled evidence revised here indicates that prolonged breastfeeding beyond 24 months is a significant risk factor for ECC compared to non-breastfed children. The odds of ECC is almost three times higher in children breastfed for more than 24 months than in those not breastfed at the same age. Regarding breastfeeding between 12-24 months, this meta-analysis found no significant risk of ECC, although the odds of ECC was notably higher during this period. This suggests no protective effect of breastfeeding against dental caries at this specific age, which contradicts previous reviews that claimed a protective effect of prolonged (12-24 months) breastfeeding.[10,11]

The results of this review suggest that recommendations to maintain breastfeeding for 24 months or beyond, as advocated by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), should be interpreted with caution. Despite the known benefits for children's general health and development[47,48], this practice should be accompanied by parental guidance, dietary instructions regarding cariogenic foods, and efficient oral hygiene regimens due to the risk of dental caries. Dental caries not only affect dental health but also lead to other health consequences, such as pain, infection, altered eating and sleep habits, impaired cognitive development, reduced speech development, stunted growth, decreased concentration, and poor quality of

life.[49,50] Conversely, breastfeeding up to 12 months does not appear to pose a risk for dental caries and related comorbidities, as supported by previous reviews[9,10,11], with a potential protective effect against dental caries.[8,10]

Shrestha et al. (2024)[11] found significant differences in dental caries between children breastfed for less than 12 months and those breastfed for 12 months or more, as well as between those breastfed for less than 18 months and those breastfed for 18 months or more. They also reviewed three studies analyzing the influence of nocturnal breastfeeding on the risk of early childhood caries (ECC) compared to no nocturnal breastfeeding. Although their findings suggest that breastfeeding for more than 12 months and nocturnal breastfeeding increase the risk of ECC, their meta-analysis of cohort studies did not demonstrate a statistically significant risk of ECC in children older than 12 months.

In contrast, the present meta-analysis demonstrated an increased risk of ECC in children breastfed for more than 24 months and a higher odds of ECC between 12 to 24 months. However, nocturnal feeding habits were not assessed here due to the scarcity and heterogeneity of studies. This heterogeneity stems from the variety of feeding habits, including sugary drinks, bottle feeding, and breastfeeding, making it difficult to draw definitive conclusions. Only one study detailed nocturnal feeding habits in children beyond 18 months and was included in the qualitative analyses. According to their results, nocturnal feeding habits increase the risk of ECC related to prolonged breastfeeding.[29]

A cariogenic diet is a significant risk factor for dental caries and can confound the association with prolonged breastfeeding. Although most studies attempt to address this and other confounding factors, the variability in dietary habits and the methods used to collect this information—typically interviews or questionnaires with caregivers—remain significant confounding factors. Some studies did not explain how they accounted for the impact of cariogenic diets on the risk of ECC in prolonged breastfeeding samples.[31,32,33] Consequently, we could not evaluate the impact of diet on the risk of ECC in prolonged breastfeeding. Additionally, oral hygiene practices were inconsistently analyzed in the primary studies, introducing further bias.

This review identified several limitations: a substantial number of studies did not report the method of dental caries diagnosis, there was a lack of data for

calculating RR or OR, there were no reports on children's nocturnal feeding habits, some studies did not evaluate the influence of cariogenic diets alongside prolonged breastfeeding, and some studies did not assess the impact of oral hygiene frequency and habits on the risk of dental caries during prolonged breastfeeding. In addition, the cumulative evidence derived from the cohort studies was deemed to have low confidence.

Future studies should employ standardized and validated methods for diagnosing dental caries to ensure consistency and comparability across research. They should also include comprehensive dietary assessments that account for all types of food and drink consumption, particularly sugary and cariogenic foods, to control for dietary confounding factors. It is also important that these investigations evaluate the impact of different oral hygiene practices and regimens on the risk of ECC in breastfed children, considering factors such as brushing frequency, use of fluoride, and parental supervision. Additionally, they should investigate the specific impact of nocturnal breastfeeding and other nighttime feeding habits on ECC, with detailed data collection on the frequency and duration of nocturnal feedings.

This systematic review indicates that prolonged breastfeeding beyond 24 months significantly increases the risk of early childhood caries (ECC), with a odds almost three times higher compared to non-breastfed children, while breastfeeding between 12-24 months does not show a significant risk despite higher ECC odds. The findings suggest that recommendations for breastfeeding up to 24 months or beyond should be interpreted cautiously and supplemented with parental guidance, dietary instructions, and oral hygiene practices. The review highlights the need for future studies to use standardized diagnostic methods, comprehensive dietary assessments, and detailed evaluations of oral hygiene and nocturnal feeding habits to address current research limitations and better understand the relationship between prolonged breastfeeding and ECC.

Bullet Points:

- This systematic review highlights a significant association between prolonged breastfeeding (beyond 24 months) and an increased risk of early childhood caries (ECC), indicating the need for careful monitoring of dental health in children who are breastfed for extended periods.
- Provides clarity on the specific risk factors associated with prolonged breastfeeding (>12 months) and their implications for early childhood caries, aiding in targeted preventive strategies and patient education.
- The findings suggest that while breastfeeding up to 12 months may be beneficial, extended breastfeeding beyond 24 months could increase the risk of ECC, prompting pediatric dentists to consider this when advising parents in the context of WHO and UNICEF's breastfeeding recommendations.

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Table 1. Summary of descriptive characteristics of included articles.

Author, Year	***Country***	***Study Design***	***Sample*** *(N)*	***Gender*** *(Male/Female)*	***Follow-up***	***Age Distribution*** *(Months)*	***Breastfeeding Duration*** *(<12 months; 12-24 months; >24 months))*	***Bottle Feeding Duration*** *(<12 months; 12-24 months; >24 months)*	***Criteria for Dental Caries Diagnosis***	***DMFT index****	***Nocturnal feeding*** *(yes or no)*	***Cariogenic diet*** *(yes or no/ description)*	***Oral hygiene habits*** *(yes or no and/or description)*	***Breastfeeding Frequency***	***Bottle feeding Frequency***	***Risk or dental caries (RR/HR/OR 95% CI) and breastfeeding***	***Main conclusions***
Abanto et al., 2022.	,Brazil	Cohort	800	-	2 years	-	<12 months: 247 12-23 months: 439 ≥24 months: 114	No: 320 Yes: 480 *2 years old	WHO	-	-	No: 22 Yes: 778 1-3 times a day: 277 ≥4 times a day: 501	No: 25 Yes: 775 Toothbrushing Daily: 641 Weekly: 132	-	-	12-23 months: OR: 1.13 CI: 1.05-1.20 ≥24 months OR: 1.27 CI: 1.14-1.40 -	Prolonged breastfeeding is a weak risk factor for dental caries. Reduced sugar consumption at 2 years old mitigates this risk. With a 22.8% early childhood caries rate, focused interventions are crucial in the first 1000 days to promote healthy feeding, breastfeeding, and limited sugar intake.
Barroso et al., 2021	Brazil	Cohort	132	Male: 62 Female: 70	3 years	<24 months: 83 24-36 months: 49	< 24 months: 66 > 24 months: 66	< 24 months: 81 > 24 months: 51	ICDAS	-	No	Yes Low sugar consumption:70 High sugar consumption: 62	Supervised Toothbrushing: 108 Not Supervised Toothbrushing: 24	-	-	> 24 months: RR 2.24 CI:1.23-4.08	In conclusion, breastfeeding for more than 24 months was a risk factor for severe dental caries, alongside early childhood caries and non-nuclear family structure. Caution is needed when extrapolating these results due to uncontrolled variables like

																breastfeeding frequency and nighttime breastfeeding habits.
Bernabé et al., 2016	Scotland	Cohort	1.102	Male: 592 Female: 510	4 years	Birth-48 months	<6 months: no related >6 months: 194	-	-	-	-	-	-	-	-	Coefficient (linear mixed effects) <6 months: 0.02 CI: -0.23-0.28 >6 months: 0.06 CI: -0.25-0.37	This prospective study reveals that low birth weight and maternal smoking, rather than breastfeeding duration, were linked to caries progression from ages 1 to 4 in Scottish children.
Birungi et al., 2017	Uganda	Cohort	417	Male: 208 Female: 209	5 years	Birth-60 months	< 24 months: 196 > 24 months: 188	-	WHO	DMFT	-	Yes: Family sugar consumption index Less: 16% More 84%	Family oral hygiene index: Bad: 508 Good: 1577	-	-	Exclusive breastfeeding: IRR 0.60 CI: 0.41-0.88 > 24 months IRR 1.01 CI: 0.97-1.04	The study suggests that Directed Acyclic Graphs (DAGs) aided in assessing the causal impact of Exclusive Breastfeeding (EBF) on Early Childhood Caries (ECC) among 5-year-old Ugandan preschoolers. Results indicate a protective effect of 24 weeks of EBF on ECC. Further research, incorporating unmeasured variables from the DAGs, is crucial for robust causal assertions.
Blanco et al., 2021	Spain	Cohort	335	Male: 189 Female: 146	>12 months	48-60 months: 335	<12 months: 254 > 12 months: 81	-	-	-	-	Yes: Sugar ingestion (mg/day) Mean ingestion sugar a day:	-	-	-	1-3 months: Crude OR 0.93 CI: 0.25-3.4 3-6 months:	Breastfeeding for over 12 months correlates significantly with higher Early Childhood Caries (ECC)

											about: 110,58				Crude OR 0.76 CI: 0.25-2.32 6-9 months: Crude OR 0.38 CI: 0.07-1.93 9-12 months: Crude OR 1.97 CI: 0.67-5.78 >12 months: Crude OR 2.6 CI: 1.02-6.61	prevalence, while breastfeeding up to 12 months acts protectively against ECC. More research, incorporating fluoride toothpaste hygiene, is needed to explore this association further. No direct link was found between total energy or sugar intake and ECC prevalence.
Chaffee et al., 2014	Brazil	Cohort	715	-	38 months	36-48 months (715)	<12 months: 468 12-23: 65 > 24 months: 156	-	WHO	DMFS 3.2	-	Consuming sweet substances in bottle at age 5-9 months: 198 Consuming sweet substances in bottle at age 2-3 years: 312	-	-	-	6-11 months: PR 1.77 CI: 1.12-2.85 12-23 months: PR 1.82 CI: 0.85-3.20 24 or more months: PR 2.10 CI: 1.50-3.25	Finally, this study population, featuring a relatively high prevalence of breastfeeding and of caries, might not be representative of the breastfeeding-caries relationship in all historical, geographical, and socioeconomic contexts.
Devenish et al., 2020	Australia	Cohort	965	-	1 year	24-36 months	0-1months: 94 1-6 months: 257 6 to 12 months: 228 ≥12 months: 386	-	WHO	-	-	Yes: WHO guideline for sugars intake: Noncompliant: 134 Partially noncompliant: 224 Semi-compliant: 326 Compliant: 281	-	-	-	0 to <1 month: PR 0.64. CI: 0.25-1.62 1 to < 6 months: PR 0.85 CI:0.46-1.56 6 to 12 months: PR 1.00 > 12 months: PR 1.42 CI: 0.85-2.38	The study found no connection between breastfeeding until at least 1 year of age, including nighttime breastfeeding, and early childhood caries by ages 2 to 3. It emphasizes the importance of promoting breastfeeding initiation and duration in accordance

																	with global and national recommendations for overall health improvement.
Feldens et al.,2010.	Brazil	Cohort	340	-	4 years	48 months: 340	<12 months: 164 > 12 months: 176	-	WHO	-	12 months:197	Yes: 91	Yes, Toothbrushing with fluoride paste: 285	0-2: 192 3-6: 31 >7: 117	-	All 12 months: 0-2 daily: Crude RR 1.00 3-6 daily: Crude RR 2.04 CI: 1.22-3.39 7 or more daily: Crude RR 1.97 CI: 1.45-2.68	In conclusion, targeting early dietary factors associated with Severe Early Childhood Caries (S-ECC), programs for infants and toddlers should stress reducing high-sugar foods and maintaining meal intervals. Further research is urged to develop strategies for complex feeding practices, while emphasizing maternal education to combat childhood diseases.
Feldens et al., 2018	Brazil	Cohort	345	-	38 months	38 months: 345	at 12 months: 174	-	WHO	D1MFT: 345	-	Yes: Sugar introduction before age 6 months: 344	-	-	-	All 12 months: Moderate/ high frequency mixed-feeding (both 1 or more/day): RR 1.45 CI: 1.02-2.07 High-frequency bottle-use only (>3/day): RR 1.37 CI: 0.98-1.92 High-frequency breastfeeding only	In this population, a correlation was found between feeding frequency at 12 months—including breastfeeding and bottle use—and dental caries status at age 3. Preventive measures could include promoting less frequent nursing once complementary foods are introduced and limiting snack and

																(>3/day): RR 1.82 CI: 1.28-2.57	drink frequency. Feeding advice should consider both nutritional needs and caregivers' beliefs.
Helderman et al., 2006.	Myanmar	Cohort	163	Male: 84 Female: 79	3 years	25 to <27 months: 41 > 27 to 30 months: 122	Low 50%: 81 High 50%: 82	-	-	-	Breast nipple in child's mouth at night: No: 122 Yes:41	-	Toothbrushing before the age of 18 moths: No 147 Yes: 16	-	-	All 12 months: > 4 daytime breastfeeding: Crude OR 4.9 CI: 0.9 25.3 > 15 min/breastfeeding (day): Crude OR 3.9 CI: 0.8-19.1	The present study indicates that, besides the known caries-inducing factors such as consumption of sugars, the consumption of pre-chewed rice and nocturnal breastfeeding after the age of 12 months pose a risk for the child's developing ECC in this Myanmar community.
Hong et al., 2014.	United States	Cohort	509	-	9 years	-	6 months: 361 6-12 months: 92 >12 months: 56	-	WHO	-	-	-	Yes, Daily fluoride intake Tooth-brushing	-	-	Prevalence: < 6 months: 25% > 6 months: 19%	Continuing breastfeeding beyond six months appears to lower the risk of early childhood caries in the early years. Further research with comprehensive data on breastfeeding patterns, duration, quality, and quantity, along with early-life caries examination data, is needed.
Ibrahim et al., 2009.	Osaka, Japan	Cohort	283	-	3.5 years	36 - 48 months: 283	-	-	-	-	-	-	-	-	-	18 months: Crude OR 4.7 CI: 0.9-24 30 months: Crude OR 2.4	The Cariostat score at 1.5 years not only reflects current oral health but also predicts oral condition at 2.5 and 3.5

																CI: 0.6-9.2	years. Similarly, the score at 2.5 years demonstrates this predictive ability. Children's lifestyle evolves with age, potentially impacting their caries risk status.
Ji et al., 2006	Japan	Cohort	392	-	3.5 years	36-48 months: 392	-	-	-	-	-	-	Yes, Supervised Toothbrushing	-	-	18 months: Crude OR 3.26 CI: 1.60-6.62 30 months: Crude OR 5.54 CI: 0.97-31.67	Breast feeding was the most influential factor. Actually in this study, breast feeding was the preferred with time of infant feeding before sleeping or during midnight. We found that 18-month-old children who breast-fed during waking hours oral ready weaned compared with breast feeding children, are not likely to be at higher risk for caries experience when the children was 42-month-old.
Lunteren et al., 2020	Netherlands	Cohort	4146	-	6 years	-	Breastfeeding duration: 0-6 months: 1980 6-12 months: 850 >12 months:386	-	-	DMFT=0 n=2988 DMFT>0: n=1158	Never: 2832 Ever: 409 Missing data: 905	Intake of sugar-containing products at 6 years Low (≤2 times per day):1407 High: (> 2 times per day): 2739	-	-	-	0-6 months: OR 1.00 6-12 months: OR 1.13 CI: 0.92-1.38 >12 months: OR 1.35 (CI: 1.04-1.74	We have shown that prolonged breastfeeding as well as bottle-feeding during the night are associated with an increased risk of childhood dental caries. Our findings confirm the results of earlier studies in other countries and

																	add that the associations are independent of SEP and sugar intake, and also exist in a European context that is without water fluoridation. Although future studies are encouraged that will study the potential mechanism be-tween prolonged breastfeeding and dental caries in more detail, the evidence so far clearly shows a higher risk of dental caries in children being breastfed for >12 months.
Mathias et al., 2023	Brazil	Cohort	3645	Male: 1840 Female: 1805	4 years	36-48 months	< 24 months: 2600 >24 months: 968	-	-	-	-	Yes UPF: Low/medium: 2591 High: 986	Yes, Frequency of toothbrushing: < 2 times a day: 1046 > 2 times a day: 2529	-	-	< 24 months breastfeeding: RR 1.00 > 24 months breastfeeding: RR 2.47 CI: 1.97-3.10	In conclusion, this study found no interaction between breastfeeding and UPF consumption, showing that the two exposures have different role on risk of ECC. The findings of the present study reinforce the need to adopt effective strategies to reduce the consumption of UPF and sugar-sweetened beverages in the early stages of life, and paediatric dentists should consider the

																	potential caries risk of breastfeeding for 24months or beyond.
Nakamura, 2009.	Brazil	doctoral thesis	135	-	2 years and 11 months	<35 months	-	-	WHO	-	-	-	-	-	-	OR: 31.1136 CI: 4.50-215.15	Incidence of ECC in babies indicate a strong polarization of dental caries in this sample, whose elements showed high susceptibility to caries, characterized by a high incidence in a short period after eruption, with the largest number of lesions occurred in the period corresponding to the infectivity window.
Nirunsittirat et al., 2016	Thailand	Cohort	556	Female:276 Male: 280	3-4 years	36-48 months	<6 months: 212 6-11 months: 180 12-17 months: 156 >months: 8	-	WHO	WHO	-	Sweet consumption: <3times/week: 33 4-6 times/week: 249 7-9 times;week: 198 >10 times/week: 76	Brushing frequency: None: 5 Not every day: 256 Every day: 240	Full breastfeeding: <6 months: 212 6-11: 180 12-17: 156 >18 months: 8	-	<6 months: RR 1.0 6-11 months: RR 0.77 CI:0.63,0.93 12-17 months: RR 0.93 CI: 0.77-1.12 >18 months: RR 0.67 CI: 0.40-1.11	In conclusion, this prospective study suggests the benefit of full breastfeeding for 6–11 months for dental caries prevention in primary teeth. There was no association be-tween the duration of any breastfeeding and dental caries. Prolonged breastfeeding was not associated with dental caries in this population.
Nunes et al., 2012	Brazil	Cohort	260	-	-	18-42 months	-	-	WHO	DMFT 0.8 (+-1.7)	Bottle-feeding: 0=186 1=48	Daily sucrose consumption	-	-	-	IRR 1.15 CI: 0.84-1.59	The present results showed that prolonged

											2 or more times=7	between main meals 0=24 1=45 2=76 3 or more times=96					breast-feeding was not a risk factor for ECC after adjustment for a handful of important confounders. Age, sucrose consumption between main meals, and quality of oral hygiene were associated with ECC in a low-income population, using a hierarchical analysis.
Peres et al., 2017	Brazil	Cohort	1128	-	4 years	36-48 months	0-12 months: 741 13-23 months: 129 >24 months: 258	-	-	DMFS: 4.05; SD: 7.38	-	-	-	-	-	Mean ratio: > 12 months: 1.0 13-23 months: 0.9 CI: 0.6-1.3 >24 months or beyound: 1.9 CI: 1.5-2.4	Breastfeeding for ≥24 months increases the risk of having S-ECC. We suggest adopting measures to prevent dental caries in childhood as early as possible, because breastfeeding is beneficial for children's health.
Pires et al., 2020	Brazil	Retrospective cohort	310	Male: 159 Female:151	-	0-36 months	<9 months:159 > 9 months: 151	-	-	DMFT index: ≤2: 165 >2: 145	Yes: 196 No:114	Yes:219 No: 84	Toothbrushing frequency: Once a day: 105 Two times a day or more: 76	-	-	≤9 months: OR 1.00 ≥9 months: OR 0.38 CI: 0.21-0.68	A higher caries experience in early childhood is not associated to child's daytime caring person. On the other hand, the higher caries experience is associated with low caregiver schooling and older children.

Sæthre, Wang & Wigen, 2023.	Norway	Cohort	1088	Male:583 Female:505	5 years	-	Stop 6 months: 241 Stop 8 months: 167 Stop: 11 months: 241 Stop: 14 months: 238 Stop 18 months: 174	-	-	-	Breastmilk: 64 Sugary drink or milk: 113	Less than once a week 529 Once a week or more often: 525	twice daily: 588 Less than twice daily: 527	-	-	6 months: OR 1.3 CI: 0.5-3.1 8 months: OR 1.4 CI: 0.6-3.5 11 months: OR 0.8 CI: 0.3-2.1 14 months: OR 1.3 CI: 0.5-3.3 18 months: OR 1.00	There was no association between breastfeeding up to 18 months of age and caries development during preschool age. Caries prevalence at 5years of age was associated with high frequency of sugar intake and a low frequency of tooth brushing with fluoride toothpaste.
Sritangsirikul et al., 2024	Thailand	Cohort	486	Male: 244 Female: 242	2 years	0-36 months	Duration of full breastfeeding < 6 months: 219 6–11 months: 166 12–17 months: 75 ≥ 18 months: 26 Duration of any breastfeeding < 6 months: 205 6–11 months: 129 12–17 months: 64 ≥ 18 months: 88	-	WHO	-	Never: < 6 months: 60 6–11 months: 64 12–17 months: 23 ≥ 18 months: 5 1–3 times/week: < 6 months: 46 6–11 months: 38 12–17 months: 14 ≥ 18 months: 3 > 3 times/week: < 6 months: 113 6–11 months: 64 12–17 months: 38 ≥ 18 months: 18	Number of meals: 1–2 meals: < 6 months: 84 6–11 months: 56 12–17 months: 16 ≥ 18 months: 2 ≥ 3 meals: < 6 months: 135 6–11 months: 110 12–17 months: 59 ≥ 18 months: 24 Sugar consumption between meals: ≤ 3 times/week: < 6 months: 78	Toothbrushing: Never < 6 months: 42 6–11 months: 18 12–17 months: 11 ≥ 18 months: 4 < 2 times/day: < 6 months: 90 6–11 months: 63 12–17 months: 28 ≥ 18 months: 4 ≥ 2 times/day: < 6 months: 87 6–11 months: 85 12–17 months: 36	-	-	Full breastfeeding: < 6 months: RR 1.0 6–11 months: RR 0.78 CI: 0.64-0.94 12–17 months: RR 0.79 CI: 0.62-1.02 ≥ 18 months: RR 0.94 CI: 0.77-1.13 Any breastfeeding: < 6 months: RR 1.0 6–11 months: RR 0.93 CI: 0.77-1.12 12–17 months: RR 1.1 CI: 0.85-1.43 ≥ 18 months: RR. 1.45 CI: 1.31-1.60	In conclusion, our findings support the value of continued breastfeeding throughout the first year of life and beyond, as recommended by leading organizations. A longer duration of full breastfeeding can protect against early childhood caries. However, any breastfeeding (with or without formula milk) for ≥ 18 months increases the caries prevalence. Therefore, breastfeeding practices should be strongly encouraged, along with urging caregivers to provide proper oral hygiene and dietary

												6–11 months: 53 12–17 months: 22 ≥ 18 months: 8 4–6 times/week: < 6 months: 51 6–11 months: 47 12–17 months: 21 ≥ 18 months: 9 ≥ 7 times/week: < 6 months: 90 6–11 months: 66 12–17 months: 32 ≥ 18 months: 9	≥ 18 months: 18 Fluoride toothpaste - Yes: < 6 months: 44 6–11 months: 40 12–17 months: 20 ≥ 18 months: 11 Fluoride toothpaste - No: < 6 months: 175 6–11 months: 126 12–17 months: 55 ≥ 18 months: 15				practices for children.
Tada et al., 1999	Japan	Cohort	392	Male: 215 Female: 177	3 years	24-36 months: 392	-	-	WHO	DMFT All teeth 18 months: 0.21±0.87 36 months: 1.81±3.12	-	Sweet foods No: 259 Yes: 133 Sweet beverages No: 139 Yes: 253	Frequency of toothbrusinh: Under once/day: 94 Once/day: 222 Over/twice day: 74	-	-	18 months: OR 1.00 36 months: OR 6.65 CI: 2.89-15.20	In conclusion, our data on dental caries occurrence and caries risk factors of infants indicate that bottle feeding and breast feeding were related to the increment of the DMFT from 18 months of age to three years old. This calls for dental health education with in-struction on milk feeding before the 18-month-old check-up

Tashiro et al. 2021	Japan	Cohort	387	Male: 200 Female: 187	2 years	24-36 months	18 months: Yes:110 No: 231	18 months Yes: 35 No: 306	-	-	-	Sweet beverage intake ≥4 times/week: 102 < 4 times/week: 238	Frequency of tooth brushing by parents ≥twice/day: 96 < twice/day: 245	-	-	18 months: OR: 7.106 CI: 2.857-19.455	In conclusion, the present results showed that prolonged breastfeeding was a risk factor for ECC at 18 months of age after adjustment for a number of important confounding factors. A close association was also demonstrated between quality of oral hygiene and ECC at 18 months and 3 years of age. Children brought in for regular examination and consultation under the oral care program from 12 months of age were less likely to develop ECC at 18 months and 3 years of age.
Yokoi et al. 2021	Japan	Cohort	640	-	18 months	24-36 months: 640	>18 months: 178	> 18 months: 66	WHO	-	-	3 times a day= 126	Yes: 537 No: 103	-	-	>18 months: OR 1.71 CI: 1.15-2.55	In conclusion, receiving daytime care at a nursery school, prolonged breastfeeding, and a high frequency of snacking were significantly associated with ECC risk in Japanese toddlers.

*Decay-missing-filled teeth index. (-) Not reported. OD – Odds Ratio. RR – Risk Ratio. PR – Prevalence Ratio. IRR - Incidence rate ratio. WHO – World Health Organization. CI - confidence interval.

Figure legends:

Figure 1. Flow chart showing the literature search process and selection criteria, adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA, 2020).

Figure 2. Geographical distribution of the sample and its representation in the pooled sample.

Figure 3. Risk of bias analysis of each cohort study included, using the Joanna Briggs Institute Critical Appraisal Checklist for cohort studies.

Figure 4. Forest plot in (A) displaying the overall relative risk (RR) of Early Childhood Caries (ECC) in children exposed to prolonged breastfeeding (>12 months). In (B), the overall RR of ECC associated with breastfeeding exceeding 12 months highlights the results of sensitivity analysis.

Figure 5. Forest plot presenting the prevalence of ECC in children exposed to prolonged breastfeeding (>12 months). In (A), the data are presented in odds ratio (OR), and in (B), they are presented in prevalence ratio (PR).

Figure 6. Funnel plot generated to assess potential publication bias. Figure (A) displays the studies presented in terms of relative risk, while figure (B) shows the prevalence studies.

Appendix 1. Databases and search strategies.

Database	Search strategy	Results May 17th 2024
Medline / PubMed	("Breast Feeding"[MeSH Terms] OR "Breast Feeding"[All Fields] OR "Breastfed"[All Fields] OR "Breastfeeding"[All Fields] OR "Breast Fed"[All Fields] OR "Milk Sharing"[All Fields] OR "Exclusive Breast Feeding"[All Fields] OR "Exclusive Breastfeeding"[All Fields] OR "Wet Nursing"[All Fields] OR "sharing milk"[All Fields] OR "breast feeding exclusive"[All Fields] OR "breastfeeding exclusive"[All Fields] OR "Lactation"[MeSH Terms] OR "Lactation"[All Fields] OR "lactations"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Prolonged Lactation"[All Fields] OR "Prolonged Lactations"[All Fields] OR "Prolonged breast feeding"[All Fields] OR "Prolonged breastfeeding"[All Fields] OR "lactation prolonged"[All Fields] OR "milk, human"[MeSH Terms] OR "Breast Milk"[All Fields] OR "Human Milk"[All Fields] OR "milk breast"[All Fields] OR "Milk Secretion"[All Fields] OR "Milk Secretions"[All Fields] OR "Bottle Feeding"[MeSH Terms] OR "Bottle Feeding"[All Fields] OR "Bottlefeeding"[All Fields] OR "Bottlefed"[All Fields]) AND ("Dental Caries"[MeSH Terms] OR "Dental Caries"[All Fields] OR "Dental Cavity"[All Fields] OR "Dental Decay"[All Fields] OR "Dental Cavities"[All Fields] OR "Carious Lesions"[All Fields] OR "Carious Lesion"[All Fields] OR "Carious Dentin"[All Fields] OR "Dental White Spot"[All Fields] OR "Dental White Spots"[All Fields] OR "caries dental"[All Fields] OR "cavities dental"[All Fields] OR "cavity dental"[All Fields] OR "lesions carious"[All Fields] OR "decay dental"[All Fields] OR "dentin carious"[All Fields] OR "white spot dental"[All Fields] OR "Early childhood caries"[All Fields] OR "Tooth Demineralization"[MeSH Terms] OR "Tooth Demineralization"[All Fields])	978
Embase	('breast feeding'/de OR 'breast feeding' OR breastfed OR 'breastfeeding'/de OR breastfeeding OR 'breast fed' OR 'milk sharing' OR 'exclusive breast feeding'/de OR 'exclusive breast feeding' OR 'exclusive breastfeeding'/de OR 'exclusive breastfeeding' OR 'wet nursing' OR 'sharing milk' OR 'breast feeding exclusive' OR 'breastfeeding exclusive' OR 'lactation'/de OR lactation OR lactations OR 'prolonged lactation'/de OR 'prolonged lactation' OR 'prolonged lactations' OR 'prolonged breast feeding' OR 'prolonged breastfeeding' OR 'lactation prolonged'/de OR 'lactation prolonged' OR 'breast milk'/de OR 'breast milk' OR 'human milk'/de OR 'human milk' OR 'milk breast' OR 'milk secretion'/de OR 'milk secretion' OR 'milk secretions' OR 'bottle feeding'/de OR 'bottle feeding' OR bottlefeeding OR bottlefed) AND ('dental caries'/de OR 'dental caries' OR 'dental cavity' OR 'dental decay'/de OR 'dental decay' OR 'dental cavities'/de OR	*1,128*

	'dental cavities' OR 'carious lesions' OR 'carious lesion' OR 'carious dentin' OR 'dental white spot' OR 'dental white spots' OR 'caries dental'/de OR 'caries dental' OR 'cavities dental' OR 'cavity dental' OR 'lesions carious' OR 'decay dental' OR 'dentin carious' OR 'white spot dental' OR 'early childhood caries'/de OR 'early childhood caries' OR 'tooth demineralization'/de OR 'tooth demineralization')	
Scopus	TITLE-ABS-KEY("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TITLE-ABS-KEY("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	1,191
Web of Science	TS=("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TS=("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")	390
Cochrane Library	("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding"	56

	OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed):ti,ab,kw AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization"):ti,ab,kw	
CINAHL (EBSCO)	(TI("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND TI("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")) OR (AB("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND AB("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")) OR (SU("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding	300

	OR Bottlefed) AND SU("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization"))	
LILACS / via BVS	**("Breast Feeding" OR breastfed OR breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR bottlefeeding OR bottlefed OR "Aleitamento Materno" OR aleitamento OR "Aleitamento Materno Exclusivo" OR "Alimentado ao Peito" OR "Alimentado no Peito" OR "Alimentação ao Peito" OR amamentado OR amamentação OR "Amamentação com Ama-de-Leite" OR "Compartilhamento de Leite" OR "Lactancia Materna" OR "Alimentación al Pecho" OR amamantado OR amamantamiento OR "Compartir Leche" OR "Enfermería Húmeda" OR "alimentación por nodriza" OR "compartir leche materna" OR lactação OR "Lactação Prolongada" OR "Secreção de Leite" OR "Secreções de Leite" OR lactancia OR "Lactancia Prolongada" OR "Secreciones de Leche" OR "Secreción de Leche" OR "Leite Humano" OR "Leite Materno" OR "Leche Humana" OR "Leche Materna" OR "Leche de la Madre" OR "Alimentação com Mamadeira" OR "Aleitamento por Mamadeira" OR "Alimentado por Mamadeira" OR "Alimentación con Biberón" OR "Alimentado con Biberón" OR "alimentación por biberón") AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization" OR "Cárie Dentária" OR "Cavidade Dentária" OR "Cavidades Dentárias" OR "Cárie Dental" OR caries OR "Cáries Dentais" OR "Cáries Dentárias" OR "Dente Cariado" OR "Lesões Cariosas" OR "Manchas (hipocalcificadas) Brancas Dentárias" OR "Manchas Brancas" OR "Caries Dental" OR "Caries Dentales" OR "Cavidad Dental" OR "Cavidades Dentales" OR "Lesiones Cariosas" OR "Manchas Blancas Dentales" OR "caries dentaria" OR "manchas blancas del esmalte" OR "Carious Dentins" OR "Desmineralização do Dente" OR "Desmineralização Dentária" OR**	210

	"Desmineralizações dos Dentes" OR "Desmineralización Dental") AND (db:("LILACS"))	
Bibliografia Brasileira de Odontologia (BBO) / via BVS	**("Breast Feeding" OR breastfed OR breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR bottlefeeding OR bottlefed OR "Aleitamento Materno" OR aleitamento OR "Aleitamento Materno Exclusivo" OR "Alimentado ao Peito" OR "Alimentado no Peito" OR "Alimentação ao Peito" OR amamentado OR amamentação OR "Amamentação com Ama-de-Leite" OR "Compartilhamento de Leite" OR "Lactancia Materna" OR "Alimentación al Pecho" OR amamantado OR amamantamiento OR "Compartir Leche" OR "Enfermería Húmeda" OR "alimentación por nodriza" OR "compartir leche materna" OR lactação OR "Lactação Prolongada" OR "Secreção de Leite" OR "Secreções de Leite" OR lactancia OR "Lactancia Prolongada" OR "Secreciones de Leche" OR "Secreción de Leche" OR "Leite Humano" OR "Leite Materno" OR "Leche Humana" OR "Leche Materna" OR "Leche de la Madre" OR "Alimentação com Mamadeira" OR "Aleitamento por Mamadeira" OR "Alimentado por Mamadeira" OR "Alimentación con Biberón" OR "Alimentado con Biberón" OR "alimentación por biberón") AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization" OR "Cárie Dentária" OR "Cavidade Dentária" OR "Cavidades Dentárias" OR "Cárie Dental" OR caries OR "Cáries Dentais" OR "Cáries Dentárias" OR "Dente Cariado" OR "Lesões Cariosas" OR "Manchas (hipocalcificadas) Brancas Dentárias" OR "Manchas Brancas" OR "Caries Dental" OR "Caries Dentales" OR "Cavidad Dental" OR "Cavidades Dentales" OR "Lesiones Cariosas" OR "Manchas Blancas Dentales" OR "caries dentaria" OR "manchas blancas del esmalte" OR "Carious Dentins" OR "Desmineralização do Dente" OR "Desmineralização Dentária" OR "Desmineralizações dos Dentes" OR "Desmineralización Dental") AND (**	120

	db:("BBO"))	
ProQuest Dissertations & Theses Global	**noft("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND noft("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")**	36
LIVIVO	**("Breast Feeding" OR Breastfed OR Breastfeeding OR "Breast Fed" OR "Milk Sharing" OR "Exclusive Breast Feeding" OR "Exclusive Breastfeeding" OR "Wet Nursing" OR "sharing milk" OR "breast feeding exclusive" OR "breastfeeding exclusive" OR Lactation OR lactations OR "Milk Secretion" OR "Milk Secretions" OR "Prolonged Lactation" OR "Prolonged Lactations" OR "Prolonged breast feeding" OR "Prolonged breastfeeding" OR "lactation prolonged" OR "Breast Milk" OR "Human Milk" OR "milk breast" OR "Milk Secretion" OR "Milk Secretions" OR "Bottle Feeding" OR Bottlefeeding OR Bottlefed) AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities" OR "Carious Lesions" OR "Carious Lesion" OR "Carious Dentin" OR "Dental White Spot" OR "Dental White Spots" OR "caries dental" OR "cavities dental" OR "cavity dental" OR "lesions carious" OR "decay dental" OR "dentin carious" OR "white spot dental" OR "Early childhood caries" OR "Tooth Demineralization")**	480
Google Scholar	("Breast Feeding" OR Breastfeeding OR Lactation OR "Breast Milk" OR "Bottle Feeding" OR Bottlefeeding) AND ("Dental Caries" OR "Dental Cavity" OR "Dental Decay" OR "Dental Cavities")	100

Search strategies were performed for each database by using specifics words combinations and truncations with the support of a librarian.

Appendix 2. Excluded articles and reasons for exclusion (n=20).

Author, Year	Reason for exclusion
Beckett *et al.,* 2022	2
Bell et al., 2019	4
Boustedt et al., 2018	3
Cangussu et al., 2016	3
Chattopadhyay et al., 2020	3
Conway, 2023	6
de Sousa Cabral et al., 2017	3
Kuhn & Stadler, 2007	3
Ha et al., 2023	3
Hu et al., 2019	3
Peltzer et al., 2014	4
Lam et al., 2017	4
Mizoguchi et al., 2003	3

Nakai & Mori-Suzuki, 2022	6
Nishimura et al., 2008	6
Olatosi et al., 2021	3
Schwarz et al., 2011	4
Tiberia et al., 2007	3
Uerlich et al., 2021	3
Yonezu & Yakushiji, 2008	4

(1) children with known immunological diseases, with physical, neurological or metabolic syndromes, with chronic history of infection, or with history of preterm birth (< 36 weeks); (2) children over 71 months old; (3) other types of feeding practices; (4) absence of the comparison with prolonged bottle feeding or N/A; (5) dental hypoplasia and other dental abnormalities; (6) *in vitro* studies, animal studies, case reports, cross-sectional, case-control, randomized trial, reviews, letters, personal opinions, book chapters, and conference abstracts.

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Appendix 3. Results from Joanna Briggs Institute Critical Appraisal Checklist for cohort studies (*Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Chapter 7: Systematic reviews of etiology and risk . In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. JBI, 2020. Available from https://synthesismanual.jbi.global*).

Author, year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total ΣY	Risk of Bias
Abanto et al., 2022.	Y	Y	U	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Barroso et al., 2021	Y	Y	U	Y	Y	Y	U	Y	N	N	Y	63%	Mod
Bernabé et al., 2016	NA	NA	U	Y	N	Y	U	Y	Y	NA	Y	62%	Mod
Birungi et al., 2017	U	U	U	Y	Y	Y	Y	Y	Y	NA	Y	70%	Low
Blanco et al., 2021	U	U	U	Y	N	Y	U	Y	Y	NA	Y	50%	Mod
Chaffee et al., 2014	U	U	U	Y	N	Y	U	Y	Y	NA	Y	50%	Mod
Devenish et al., 2020	Y	Y	Y	Y	Y	Y	U	Y	N	N	Y	72%	Low
Felden et al.,2010.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Feldens et al., 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	90%	Low
Helderman et al., 2006.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Hong et al., 2014.	Y	Y	U	N	NA	Y	U	Y	Y	NA	Y	55%	Mod
Ibrahim et al., 2009.	Y	Y	Y	N	NA	Y	U	Y	Y	NA	Y	66%	Mod
Ji et al., 2006	Y	Y	N	Y	N	Y	U	Y	Y	U	Y	54%	Mod
Lunteren et al., 2020	Y	Y	Y	Y	Y	U	Y	Y	Y	NA	Y	90%	Low
Mathias et al., 2023	N	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Nakamura, 2009.	Y	Y	Y	U	U	Y	Y	Y	Y	NA	Y	70%	Low
Nirunsittirat et al., 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Nunes et al., 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Peres et al., 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Pires et al., 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Sæthre, Wang & Wigen, 2023.	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Sritangsirikul et al., 2024	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%	Low
Tada et al., 1999	Y	U	Y	Y	Y	Y	Y	Y	Y	NA	Y	90%	Low
Tashiro et al. 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low
Yokoi et al. 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	Y	100%	Low

Y yes, *N* no, *U* unclear, *NA* not applicable
Q1. Were the two groups similar and recruited from the same population?
Q2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?
Q3. Was the exposure measured in a valid and reliable way?
Q4. Were confounding factors identified?
Q5. Were strategies to deal with confounding factors stated?
Q6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?
Q7. Were the outcomes measured in a valid and reliable way?
Q8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?
Q9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?
Q10. Were strategies to address incomplete follow up utilized?

Q11. Was appropriate statistical analysis used?

Total = ΣY/applicable items (the not applicable (NA) items were excluded from the sum)
Risk of bias (methodologic quality) was categorized as high when the study reaches up to 49% score “yes”, moderate when the study reached 50 to 69% score “yes”, and low when the study reached more than 70% score “yes”

Appendix 3. GRADE

Question: What is the risk of ECC associated to prolonged breastfeeding?

Certainty assessment							Sample		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	With ECC Exposed to prolonged breastfeeding	With ECC Not Exposed to prolonged breastfeeding	Relative (IC 95%)	Absolut (IC 95%)		
Risk of developing caries associated with prolonged breastfeeding												
7	observational studies - cohort	not serious	serious	not serious	not serious	dose response gradient	900/2194 (41.0%)	1872/6257 (29.9%)	RR 1.44 (1.01 - 2.07)	132 per 1.000	⊕⊕◯◯ Low	CRITICAL