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WALBERT DE ANDRADE VIEIRA

FATORES CLÍNICOS ASSOCIADOS AOS TRAUMATISMOS DENTÁRIOS EM CRIANÇAS E ADOLESCENTES BRASILEIROS:

UMA REVISÃO SISTEMÁTICA E META-ANÁLISE

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A SYSTEMATIC REVIEW AND META-ANALYSIS

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Dissertação apresentada à Faculdade de Odontologia de Piracicaba da Universidade Estadual de Campinas como parte dos requisitos exigidos para a obtenção do título de Mestre em Clínica Odontológica, na Área de Endodontia.

Dissertation presented to the Piracicaba Dental School of the University of Campinas in partial fulfillment of the requirements for the degree of Master in Clinical Dentistry, in Endodontics area.

Orientadora: Profa. Dra. Adriana de Jesus Soares

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RESUMO

O traumatismo dental (TD) é considerado um problema de saúde pública mundial e, para aplicação de medidas preventivas, é necessário o conhecimento de fatores predisponentes ao seu acometimento. Desta forma, o objetivo deste estudo foi investigar a associação entre fatores de risco clínicos (tipo de selamento labial, overjet acentuado e mordida aberta anterior) e trauma dental em crianças e adolescentes brasileiros. Esse estudo trata-se de uma Revisão Sistemática, conduzida seguindo as recomendações PRISMA e registrada na base de dados PROSPERO (CRD42020156290). A busca foi realizada em seis bases de dados eletrônicas (MedLine (via PubMed), Scielo, LILACS, Scopus, Embase, Web of Science) até julho de 2020. As bases de dados OpenGrey e OpenThesis foram utilizadas para busca parcial da "literatura cinzenta". Foram incluídos apenas estudos observacionais (coorte, caso-controle e transversal) realizados no Brasil com crianças e adolescentes (0 a 19 anos), sem restrição de ano ou idioma de publicação. Dois revisores realizaram a extração dos dados e avaliaram o risco de viés dos estudos incluídos por meio do checklist proposto por Fowkes e Fulton. As meta-análises foram estratificadas pelo tipo de dentição (decídua, mista e permanente) e faixa etária (7 a 14 anos), utilizando modelos fixos ou randômicos, Odds Ratio (OR) como medida de efeito e 95% de intervalo de confiança. A heterogeneidade entre os estudos foi avaliada pelo teste I^2. O gráfico de funil e o teste de Eeger foram utilizados para detectar viés de publicação. Três testes de sensibilidade foram realizados para cada análise (considerando o rico de viés e/ou a presença de outliers). A certeza de evidência foi avaliada pela abordagem GRADE. A busca resultou em 2493 registros, dos quais 55 foram incluídos na análise qualitativa. A amostra total foi composta por 66.576 crianças e adolescentes. A maioria dos estudos (67%) apresentou baixo risco de viés. As meta-análises demonstraram que crianças e adolescentes com selamento labial inadequado possuem entre 1.86 e 2.36 mais chances de sofrerem TD, enquanto àquelas com overjet acentuado possuem entre 1.99 e 3.11 mais chances, e crianças na dentição decídua com mordida aberta anterior possuem 1.76 mais chances de sofrerem TD. A certeza de evidência variou entre muito baixa a moderada. Portanto, pode-se concluir que selamento labial inadequado, overjet acentuado e presença de mordida aberta anterior estão associados à ocorrência de traumatismos dentais em crianças e adolescentes brasileiros.

Palavras chaves: Brasil; Epidemiologia; Maloclusão; Traumatismos Dentários.

ABSTRACT

Dental trauma (DT) is considered a worldwide public health problem, and for applications of preventive measures, knowledge of predisposing factors is necessary. Therefore, this study aimed to investigate the relation between oral characteristics (type of lip coverage and malocclusions) and dental trauma in Brazilian children and adolescents. This study is a Systematic Review and followed the PRISMA statement and was registered in the PROSPERO (CRD42020156290) database. The searching was done in six electronic databases (MedLine (via PubMed), Scielo, LILACS, BBO, Scopus, Embase, Web of Science). Open Grey and OpenThesis were consulted for 'grey literature'. At most, only observational studies were included (cohort, case-control and cross-sectional), and they were performed in Brazil with children and adolescents from 0 to 19 years, with no restrictions of year or language of publication. Two reviewers evaluated the risk of bias in the studies included in the checklist proposed by Fowkes and Fulton. Then, meta-analyzes were stratified by dentition type (deciduous, mixed, or permanent) or age range using fixed or random models, Odds Ratio (OR) as a measure of effect and 95% confidence interval. The heterogeneity between studies was assessed using the I^2 test. Funnel plot and Egger test were used to detect publication bias. Three sensitivity tests were performed (considering the risk of bias and / or the presence of outliers). Certainty of evidence was assessed by GRADE approach. The search resulted in 2493 records which 55 were included in the qualitative analysis. The total sample consisted of 66576 children and adolescents. Most studies (67%) had a low risk of bias. Meta-analyzes have showed that children and adolescents having inadequate lip coverage are between 1.86 and 2.36 more likely to suffer from DT while those having increased overjet have between 1.99 and 3.11 more chances. Other than that, children in primary dentition with anterior open bite have 1.76 more chances of suffering from DT. The certainty of evidence varied from very low to moderate. Therefore, it can be assumed that inadequate lip coverage, increased overjet and presence of open bite are related to dental trauma occurrence in Brazilian children and adolescents.

Keywords: Brazil; Epidemiology; Malocclusion; Tooth injuries.

SUMÁRIO

1 INTRODUÇÃO

O traumatismo dental (TD) é definido como o resultado de um impacto externo sobre o dente, cuja magnitude ocasiona lesões aos tecidos dentais e de sustentação (Andreasen; Andreasen & Andersson, 2007). De acordo com o sistema de classificação utilizado pela Associação Internacional de Traumatismos Dentais (IADT), o TD pode ser categorizado de acordo com o tipo de tecido lesionado, sendo: (1) Lesões aos tecidos duros do dente (trinca de esmalte, fratura de esmalte, fratura de esmalte e dentina com ou sem exposição pulpar, fratura corono-radicular, fratura radicular e fratura alveolar); (2) Lesões aos tecidos de sustentação do dente (concussão, subluxação, luxação extrusiva, luxação intrusiva, luxação lateral e avulsão) (Levin et al., 2020). Apesar de categorizados separadamente, é comum pacientes apresentarem múltiplas lesões em um ou em vários dentes (Bourguignon et al., 2020).

Do ponto de vista epidemiológico, o TD é considerado um sério problema de saúde pública mundial. Aproximadamente um bilhão de pessoas já sofreram algum tipo de TD (Petti et al., 2018a), afetando as dentições decídua, mista ou permanente. Em termos práticos, comparados a outras condições clínicas que afetam o corpo humano, o TD poderia ser considerado a quinta injúria mais prevalente do mundo, atrás somente da cárie, cefaleia de tensão, anemia por deficiência de ferro e perda auditiva relacionada a idade (Petti et al., 2018b).

No Brasil, a prevalência de TD se apresenta de forma similar ao encontrado no mundo (Vieira, 2020). Em levantamento epidemiológico multicêntrico realizado pelo Ministério da Saúde por meio da Pesquisa Nacional de Saúde Bucal (Projeto SBBrasil, 2010), a prevalência geral de TD em crianças de 12 anos de idade foi de 20,5%, apresentando-se de forma equivalente em todas as regiões brasileiras - a região Norte apresentou o maior índice (25,3%), enquanto a região Sudeste apresentou a menor prevalência (18,8%) (Brasil, 2012).

Os impactos causados pelo TD podem ser identificados em diferentes aspectos na vida do indivíduo afetado. É comum observar necrose pulpar e reabsorções radiculares em dentes que sofreram traumatismos severos (Souza et al., 2018), situações que requerem um tratamento especializado e que podem causar desconforto e ansiedade, além de gastos financeiros não planejados ao paciente ou responsáveis (Andersson, 2013). Além disso, danos estéticos também

são comuns, e quando não tratados podem interferir diretamente na vida e na forma de interação social do paciente (Bomfim et al., 2017; Zaror et al., 2018).

Por se tratar de um problema de saúde pública mundial (Petti et al., 2018a) e com impactos diretos à vida do indivíduo afetado, a prevenção de novos casos de TD requer políticas públicas imediatas. Nesse contexto, o conhecimento de fatores associados à prevalência do TD na população brasileira é de grande importância para implementação de medidas preventivas específicas para essa população. Os fatores de risco comumente citados na literatura são características clínicas, como selamento labial inadequado e má oclusões (Soares, 2018; Corrêa-Faria et al., 2016; Petti et al., 2015). Embora alguns estudos brasileiros tenham avaliado a associação dessas características com a prevalência e incidência de TD em crianças e adolescentes, seus resultados mostram grandes divergências (Viegas et al., 2010; Siqueira et al., 2013; Damé-Teixeira et al., 2013; Francisco et al., 2013).

Uma revisão sistemática anterior investigou os fatores de risco para TD na população latino-americana e caribenha, e confirmou que o selamento labial inadequado e overjet maior que 5 mm são fatores predisponentes para TD (Aldrigui et al., 2014). No entanto, esta revisão incluiu apenas crianças de 12 anos e todos os estudos brasileiros selecionados foram realizados antes de 2010. Assim, considerando que o Brasil é um dos países que mais publica estudos sobre a epidemiologia de TD (Petti et al., 2018a), esses dados estão desatualizados. Além disso, os fatores de risco relacionados à TD na dentição decídua ou mista em crianças não foram descritos, o que representa uma lacuna na literatura.

Nesse contexto, muito embora exista uma grande quantidade de estudos sobre TD realizados no Brasil, seus resultados são divergentes e não há nenhuma revisão sistemática que tenha sumarizado tais achados e determinado quais fatores clínicos estão associados aos traumatismos dentárias de acordo com a faixa etária e tipo de dentição da população brasileira. Portanto, o objetivo da presente revisão sistemática é investigar a associação entre características clínicas (selamento labial, overjet e mordida aberta anterior) e TD em crianças e adolescentes brasileiros. As hipóteses nulas testadas nesse estudo foram: (1) Crianças e adolescentes com selamento labial inadequado não apresentarão maiores chances de sofrerem traumatismos dentários quando comparadas a crianças com selamento labial adequado, em qualquer faixa etária; (2) Crianças e adolescentes com overjet acentuado não apresentarão maiores chances de

sofrerem traumatismos dentários quando comparadas a crianças com selamento labial adequado, em qualquer faixa etária; (3) Crianças e adolescentes com mordida aberta anterior não apresentarão maiores chances de sofrerem traumatismos dentários quando comparadas a crianças com selamento labial adequado, em qualquer faixa etária.

2 ARTIGO: Are inadequate lip coverage and malocclusions associated with dental trauma in brazilian children and adolescents? – a systematic review and meta-analysis

Artigo submetido ao periódico Dental Traumatology (Anexo 2)

ABSTRACT

Background/Aims: Dental trauma (DT) occurs frequently during infancy and adolescence, therefore understanding the factors associated with its occurrence in these age groups is essentially important to establish specific preventive measures. This study aimed to investigate the relation of lip coverage, overjet size, and open bite to dental trauma in Brazilian children and adolescents.

Methodology: The review protocol was registered in the PROSPERO database (CRD42020156290) and the bibliographic search was performed in eight electronic databases until July 2020. The studies included were observational, performed in Brazil, with healthy children and adolescents (0 to 19 years old), and without the restriction of date or language. Two reviewers assessed the individual risk of bias of the eligible studies with a standardised checklist. The meta-analyses were stratified by dentition stage and age range using fixed or random effects, odds ratio (OR) as the effect measure, and 95% confidence interval. The heterogeneity across studies was assessed with the I^2 test and the GRADE approach assessed the certainty of evidence.

Results: The search presented 2,493 initial results, from which 55 met the eligibility criteria and were included. Most studies (67%) presented a low risk of bias and were published between 2000 and 2019. Children and adolescents presenting inadequate lip coverage are 1.86 to 2.36 times more likely to suffer from DT, while those with increased overjet are 1.94 to 3.11 times more likely. Children with primary dentition and anterior open bite are 1.76 (95% CI: 1.20 - 2.59) times more likely to suffer from DT. The certainty of evidence varied from very low to moderate.

Conclusion: Inadequate lip coverage, increased overjet, and anterior open bite are associated with the occurrence of dental trauma in Brazilian children and adolescents.

Keywords: Brazil; Epidemiology; Risk factors; Tooth injury.

INTRODUCTION

Dental trauma is a common condition in dental practice affecting mainly the young population[1]. In fact, approximately 20% of Brazilian children or adolescent have already suffered some kind of dental trauma, as much as in permanent or as in deciduous dentition[2]. Trauma can happen for several reasons: falls, domestic or automobile accidents, or during sports practice and violence situations[3-5].

The impacts caused by dental trauma can be identified in different aspects in the life of the ones affected by them. It is common to observe pulp necrosis and root resorption in teeth that have already suffered severe trauma[6]. Generally, it is followed by situations that require specialized treatment, and they might cause discomfort, anxiety in addition to unplanned financial expenses for the patient or guardians[7]. Besides that, aesthetic damage is common, especially when untreated, as it can directly interfere with the patient's quality of life and his/her social interaction[8,9].

As it is a worldwide public health problem[10], avoidance of new cases in dental trauma requires immediate public policies. In such manner, being aware of factors associated with dental trauma prevalence in the Brazilian population is of great importance for the implementation of specific preventive measures for this population. The most common factors are oral characteristics presented by the patient, such as increased overjet, inadequate lip sealing and malocclusions.[5,9,11]. Even though some Brazilian studies have already assessed these characteristics in the prevalence and incidence of dental trauma in children and adolescents[5,9,11], their results show great divergences. As it is a country with continental dimensions, different methodologies and regional characteristics might influence the findings[2]. Therefore, it is necessary a summarization of the gathered data in order to achieve a consensus on which factors are most associated with the dental trauma prevalence in Brazil.

Thus, this systematic review aimed to investigate the association between clinical factors and the presence of dental trauma in Brazilian children and adolescents.

MATERIAL AND METHODS

This systematic review was performed according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) recommendations[12] and a protocol was registered *a priori* in the PROSPERO database (CRD42020156290). Initially, the protocol

was developed to assess all risk factors related to dental trauma (DT) in Brazilian children and adolescents. However, due to a large number of variables, only the clinical factors most cited in the literature were used, namely overjet size, lip coverage, and open bite. Thus, the protocol initially registered was adjusted for the new outcome, guiding question, and eligibility criteria. This adjustment was made during the initial bibliographic search and before the study selection and data extraction.

The guiding question was defined as: "Are Brazilian children and adolescents with inadequate lip coverage, increased overjet, or anterior open bite more likely to suffer dental trauma than those without such clinical conditions?"

Eligibility criteria

The inclusion criteria were based on the PECO mnemonic, where:

- **Population:** Brazilian children and adolescents aged 0-19 years, regardless of sex, ethnicity, or other sociodemographic factors. The 19-year-old threshold was established according to the classification of the World Health Organization for “adolescent”.[13]
- **Exposition:** Increased overjet (any threshold), anterior open bite, or inadequate lip coverage.
- **Comparator:** Non-exposed participants (normal overjet, adequate lip coverage, and the absence of anterior open bite).
- **Outcome:** Presence of any type of dental trauma diagnosed by any classification system, as long as the diagnostic criteria and methods were clearly described in the studies.
- **Study design:** Cohort, case-control, or cross-sectional. There were no restrictions on date or language.

Exclusion criteria

Reviews; letters to the editor; personal opinions; books; congress abstracts; case reports or case series; studies with participants presenting a cleft lip and/or palate, other craniofacial deformities, or any syndrome or special needs (i.e., cerebral palsy or autism); and studies with samples composed only of traumatized teeth were excluded. In the case of studies with overlapping results, the most recent study was considered.

Information Sources and Search Strategy

The bibliographic search was performed until July 2020 in the following databases: Embase, Medline (via PubMed), SciELO, Scopus, Web of Science, Latin-American and Caribbean Health Sciences Literature (LILACS), OpenThesis, and OpenGrey. Additionally, the

references of eligible studies were manually verified. All steps aimed to minimize selection and publication biases.

The search strategy included the following MeSH descriptors: "*Tooth Injuries", "Tooth Avulsion", "Maxillofacial injuries", "Brazil"*. Additionally, the following synonyms and free terms were used to enhance the research: *"Traumatic dental injury"*, "*Dental Trauma*", *"Crown Trauma", "Tooth Luxation", "Dental injuries", "Oral Injuries", "Brazilian"*. The Boolean operators AND and OR were used to enhance the research strategy through several combinations (Supplementary Table 1). The search strategies were adapted for each database according to their rules of syntax.

Study Records

The results obtained were exported to the EndNote Web™ software (Thomson Reuters, Toronto, Canada), and duplicates were removed. Then, they were exported to Microsoft Word (Microsoft ™, Ltd, Washington, USA) as well as the results obtained in the "grey literature", in which the remaining duplicates were removed manually.

The study selection was performed in two phases. In the first phase two calibrated reviewers (WAV and PHG) performed a methodical analysis of all titles and abstracts of the studies, independently. Studies containing titles meeting the study objectives yet not having abstracts available were fully read in phase two.

Finally, in the second phase, eligible preliminary studies had their full texts evaluated to verify whether they fulfilled the eligibility criteria. When both reviewers disagreed, a third one (AJS) was consulted to make a final decision.

Data items

After the selection, a calibration exercise was performed with both reviewers (WAV and PHG), in which some information was extracted jointly from an eligible study. Any disagreement between the reviewers was solved through discussions and when two reviewers disagreed, a third one (AJS) was consulted to make a final decision. The two reviewers (WAV and PHG) extracted the following data: identification (author, year, city, state, and region of the research), sample characteristics (number of patients and distribution by sex, age range, and dentition type), characteristics of data collection (sample collection location, trauma diagnosis criteria, and clinical characteristics), main results, and funding sources. In the case of missing data, the corresponding authors were contacted by e-mail.

Risk of individual bias of included studies

The checklist proposed by Fowkes and Fulton[14] was used to assess the risk of bias in eligible studies. The tool is based on five domains: (1) whether the study design was appropriate for the objectives; (2) whether the sample was representative; (3) whether the control group was acceptable; (4) whether the quality of the measurements and outcomes was proper; (5) how confounding factors and distorting influences were addressed. Then, two calibrated reviewers (WAV and PHG) have assessed the risk of bias for each eligible study independently. Each item was classified as 'major problem', 'minor problem', 'no problem' or 'not applicable'. In case of divergence between reviewers, a third one was consulted (AJS).

To determine the risk of bias in each study, three questions were formulated by the end of the evaluation: (1) Are the results erroneously biased in a certain direction?; (2) Are there any serious confounding or other distorting influences?; (3) Is it likely that the results occurred by chance? If the answer for all three questions was "no," then the study was considered to have a low risk of bias and reliable.[14]

Data Synthesis

Meta-analyses were performed to verify the relationship between DT and clinical factors. This study used odds ratio (OR) as the effect measure and a 95% confidence interval (CI). All analyses were considered as they included the number of events (traumatic dental injuries) and the total population of each group (exposed group - subjects with inadequate lip coverage, and non-exposed control group - subjects with adequate lip coverage). For the overjet analysis, the thresholds of > 2 mm, > 3 mm, ≥ 3 mm, and > 5 mm were considered. Initially, meta-analyses were performed according to the dentition type, based on the age range of the population: primary dentition (0–6 years), mixed dentition (7–11 years), and secondary dentition (12–19 years).[15] Due to the large number of studies overlapping dentition types in the same sample (children in mixed or secondary dentition, aged 8 to 13 years), meta-analyses were also performed based on the age range that best represents these studies (7 - 14 years).

The heterogeneity across studies was evaluated with I^2 statistics and classified as low (I^2 <50%), moderate (I^2 = 50% to 75%), and high (I^2> 75%).[16] Initially, the random effects model was used in all analyses to minimize the heterogeneity effect among the studies. When the I^2 was low (<50%), the analysis was supplemented with the fixed model.[15] All analyses were performed with R software with meta and metafor packages.[17]

Supplementary analysis

When possible, three sensitivity tests were performed for each meta-analysis: (1) only studies with a low risk of bias were included; (2) outliers were removed; (3) only studies with a low risk of bias and removing outliers.

The funnel plot was used for the publication bias analysis when more than 10 studies were included[18]. The publication bias was evaluated by visually inspecting asymmetry in the funnel plot and using Egger's test.

Certainty of evidence (GRADE approach)

The certainty of evidence was assessed via the Grading of Recommendation, Assessment, Development, and Evaluation (GRADE) approach[19]. The GRADE pro GDT software (http://gdt.guidelinedevelopment.org) was used to summarize the results. According to the system, observational studies start at a low level of certainty and can be downgraded based on risk of bias, inconsistency, indirect evidence, imprecision, and publication bias. On the other hand, they can be upgraded as: if a dose-effect is shown, or if the magnitude of effect is large or very large, or even if there is evidence that the influence of all plausible confounding factors would reduce a demonstrated effect or suggest a spurious effect when the results show no effect. The level of certainty among the identified evidence was characterized as high, moderate, low, or very low.[19]

RESULTS

Study selection

During the first phase of the study selection, 2,493 results were found distributed in eight electronic databases. After removing duplicates, 1,142 results remained for the analysis of titles and abstracts, from which 94 were considered eligible for the full-text analysis. After reading the full text, 39 studies were excluded (Supplementary Table 2). Thus, 55 studies[5,9,11,20-71] were selected for the qualitative analysis and 52 studies[5,9,11,20-68] for the quantitative analysis. Figure 1 reproduces the process of search, identification, inclusion, and exclusion of articles.

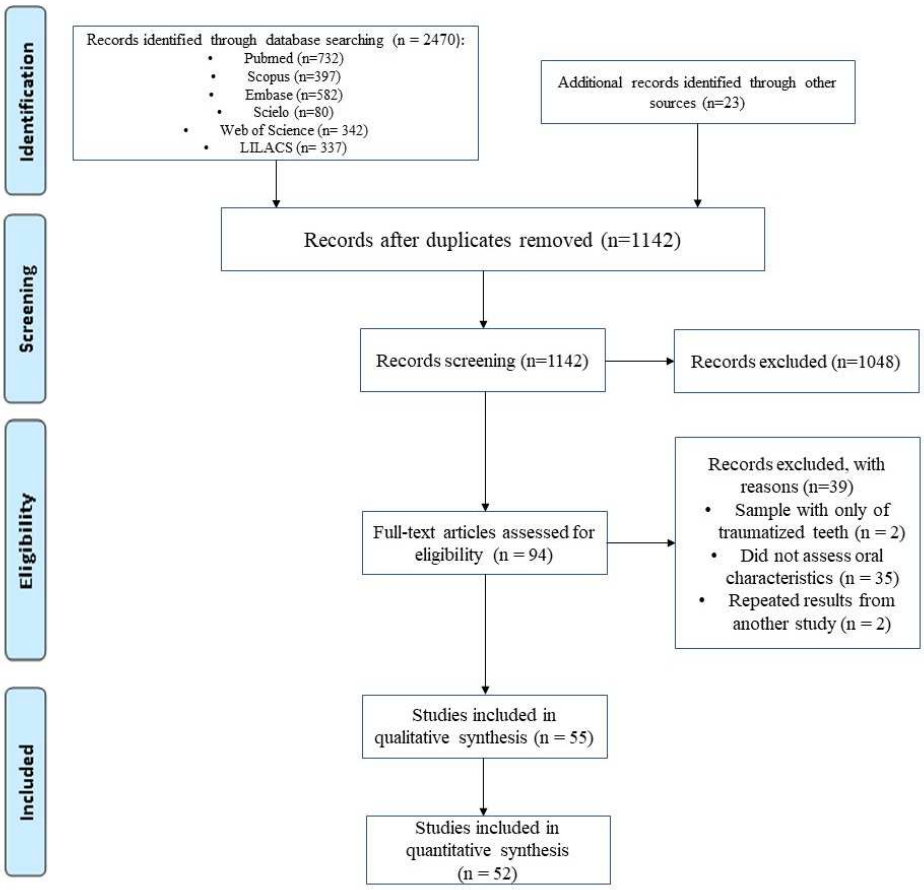

Figure 1. Flowchart of the searching and selection process for eligible studies.

Eligible studies characteristics

The studies included were performed in 10 Brazilian states and the Federal District, between 2000 and 2019. Three studies included samples from a national survey.[9,20,21] The total sample consisted of 66,576 children and adolescents aged 0 to 19 years. Most of the sample consisted of girls (n= 27,499) and secondary dentition (n= 32,330). Only 20 studies[5,21,26,29,35,38,40,42,45,48,52,54,57,59,61,66,67,69-71] declared their funding sources, which were all government agencies.

The most used diagnostic criterion among studies was by Andreasen,[5,11,22-42,67,69] followed by the one established by O'Brien.[20,43-58,68-71] Clinical examinations were performed mostly in public or private schools and health centres during national child vaccination days.

Overjet was evaluated in 48 studies[5,9,11,20-24,26,28-41,43-50-58,60,61,63-67,71] at different thresholds (Table 1). Most studies (35 out of 48)[5,9,11,20,23,24,26,28,29,31-33,35-42,45-

[48,50,52,53,55,56,58,60,61,63,66,67,71] showed a positive association between increased overjet and DT, even in adjusted models after multivariate analyses (22 out of 27 studies).[5,9,11,20,26,28,33,35,36,38-42,45-47,53,58,61,63,71] In two studies,[52,67] increased overjet lost its significance after multivariate analyses.

The presence of anterior open bite was evaluated in 13 studies,[9,28-32,35,39,59,60,62,67,69] from which eight[30,31,39,59,60,62,67,69] showed a statistically significant association with DT. Finally, inadequate lip coverage was evaluated in 35 studies,[5,22-25,27,29,31,33,35,37,38,43-57,61,68-71] from which 21[5,22-24.31,35,37,38,45,47,48,50,52,53,55-57,61,69,70] showed a statistically significant association with DT. Only in two studies[47,53] inadequate lip coverage lost its significance after multivariate analyses. Supplementary Table 3 shows the details of each eligible study.

Table 1 - Summary of main characteristics of the eligible articles (n = 55)

Characteristic	**N (%)**
Study design	
Cross-sectional	53 (96)
Case Control	1 (2)
Cohort	1 (2)
Publication year	
2000-2009	14 (24)
2010-2019	41 (76)
Publication language	
English	51 (93)
Portuguese	4 (7)
Sample origin – Brazilian region	
Northeast	8 (15)
Central-West	4 (7)
Southeast	24 (44)
Southern	16 (29)
All regions	3 (5)
Setting of the study	
Private schools	1 (2)

Public schools	13 (24)
Private and public schools	29 (53)
National Child Vaccination Day	9 (16)
Home	3 (5)
DT diagnostic classification system	
Andreasen's	25 (46)
O'Brien's	20 (36)
Others[a]	10 (18)
Type of dentition	
Deciduous	18 (33)
Mixed	2 (4)
Permanent	25 (45)
Mixed/Permanent[b]	10 (18)
Oral characteristics investigated[c]	
Lip coverage	35 (64)
Increased overjet (> 2mm)	4 (7)
Increased overjet (> 3mm)	25 (45)
Increased overjet (≥ 3mm)	4 (7)
Increased overjet (> 5mm)	15 (27)
Increased overjet (≥ 5mm)	1 (2)
Anterior open bite	13 (24)

a – Ellis's, Hinds and Gregory, Glendor, SBBrasil and OMS; b – Studies that included children from both dentitions; c – The sum of the percentages reaches more than 100% because a study may have evaluated more than one characteristic. DT – Dental Trauma

Risk of individual bias in eligible studies

Thirty-seven studies[5,9,11,20,21,25-28,33-36,38-42,44-47,51-54,56-59,61,63,65-67,69,70] presented a low risk of bias, while 18[22-24,29-32,37,43,48-50,55,60,62,64,68,71] considered important confounding factors that may have biased the results. The main shortcomings among the studies were related to the sampling method (some studies neither randomised the sample nor presented sufficient details about the randomisation), sample size (there was no sample calculation), confounding factors (the

authors did not consider confounding factors and their influence on results), and distortion reduced by analysis (the researchers did not complete statistical adjustments to reduce distortion) (Figure 2). Supplementary Table 4 shows the details of the quality assessment of each study.

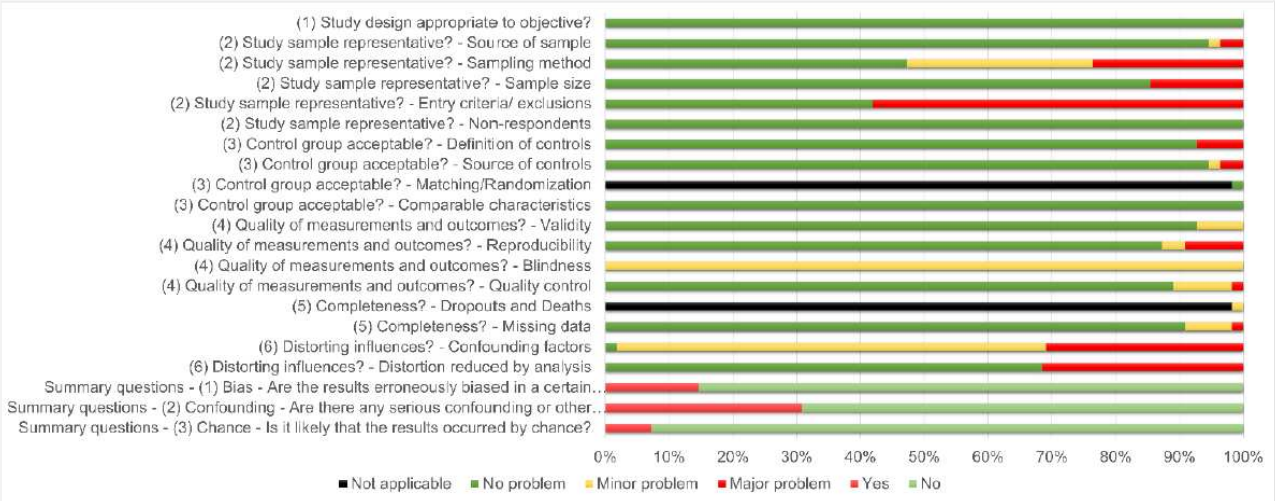

Figure 2. Assessment of risk of bias using Fowkes and Fulton checklist.

Results synthesis and meta-analysis

Lip coverage

Lip coverage was evaluated in 35 eligible studies,[5,22-25,27,29,31,34,35,37,38,43-57,61,68-71] from which 32[5,22-25,27,29, 31,34,35,37,38,43-57,61] were included in the meta-analyses. It was not possible to extract meta-analysis data from other studies[68-71]. The pooled effect showed a positive association between inadequate lip coverage and DT in all analyses (Figure 3). For the primary dentition, the pooled effect showed an odds ratio (OR) of 1.86 (95% CI: 1.24 - 2.79; n = 5,680) and an OR of 2.08 (95% CI: 1.36 - 3.19; n = 8,727) for the secondary dentition. Seven studies used samples with overlapping dentition. A meta-analysis was performed considering the age group of 7 to 14 years (mixed and secondary dentitions) and included a total of 20 studies (n = 18,189; OR: 2.36; 95% CI: 1.61 - 3.46). Heterogeneity was considered high for all analyses (I^2> 75%, p < 0.01). There were no studies including only participants in the mixed dentition.

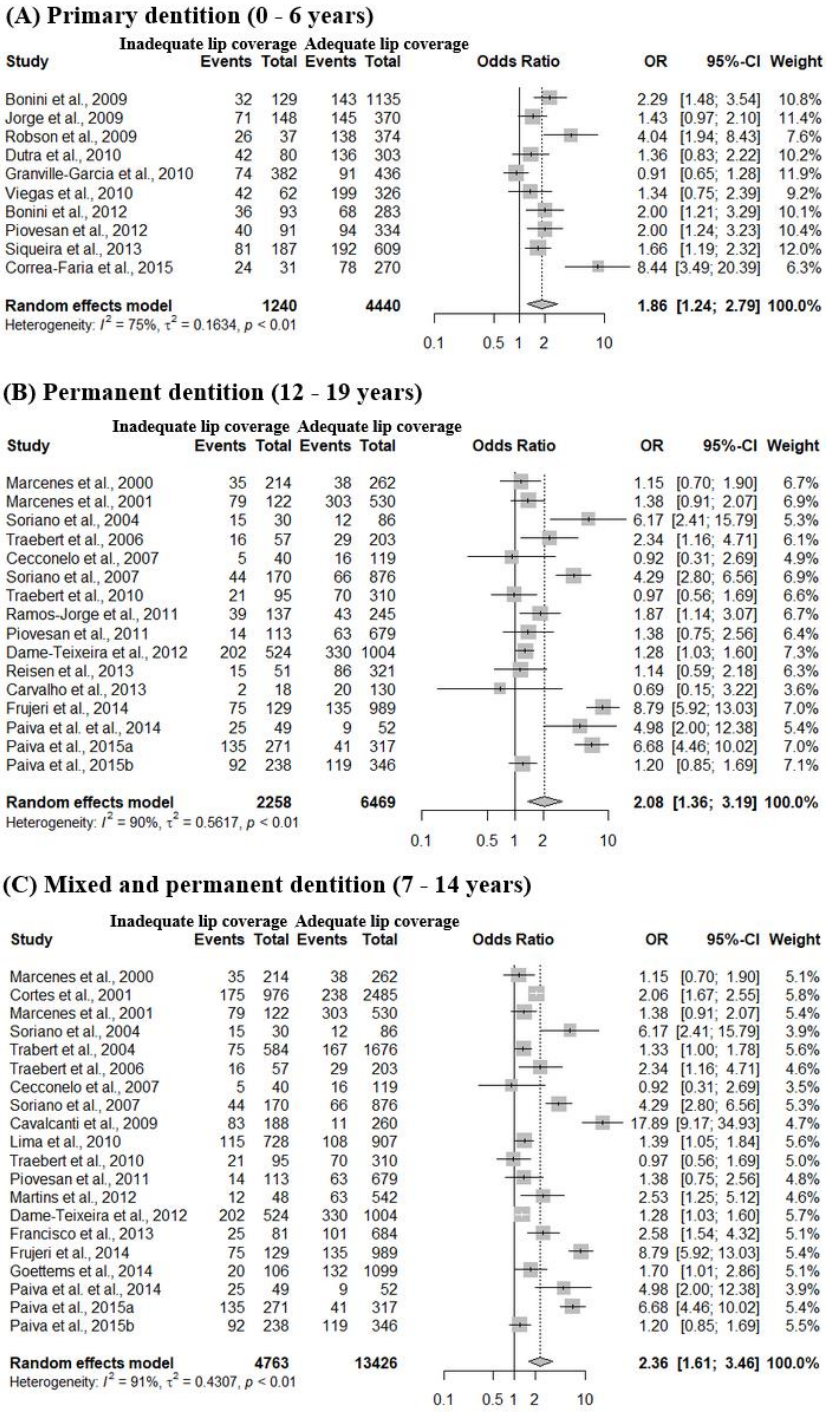

Figure 3. Forest plots of the meta-analyses on the association between lip coverage and dental trauma in different dentitions. (A) Primary dentition; (B) Mixed/secondary dentitions; (C) Secondary dentition.

Increased overjet

From the 48 studies evaluating overjet, 43 were included in the meta-analysis.[5,9,11,20-24,28,29,31-36,38-41,43-50-55,57,58,60,61,63-67] Two studies were excluded because they did not present extractable data,[30,71] one was excluded because it did not present data on people without increased overjet,[56] and two [26,37] were excluded because they used different thresholds (≥ 5 mm and ≥ 3 mm, in the secondary dentition). A meta-analysis was not possible for the mixed dentition in any thresholds due to the lack of studies.

Only the primary dentition was included in the overjet analyses with thresholds of > 2 mm and ≥ 3 mm (Figure 4). The heterogeneity observed in both analyses was low (I^2 = 0%), hence the meta-analyses were supplemented with the fixed model. A statistically significant association was observed for both thresholds: > 2 mm (n= 3,266; OR 2.14; 95% CI: 1.79 - 2.55) and ≥ 3 mm (n= 1,289; OR 2.38; 95% CI: 1.74 - 3.25).

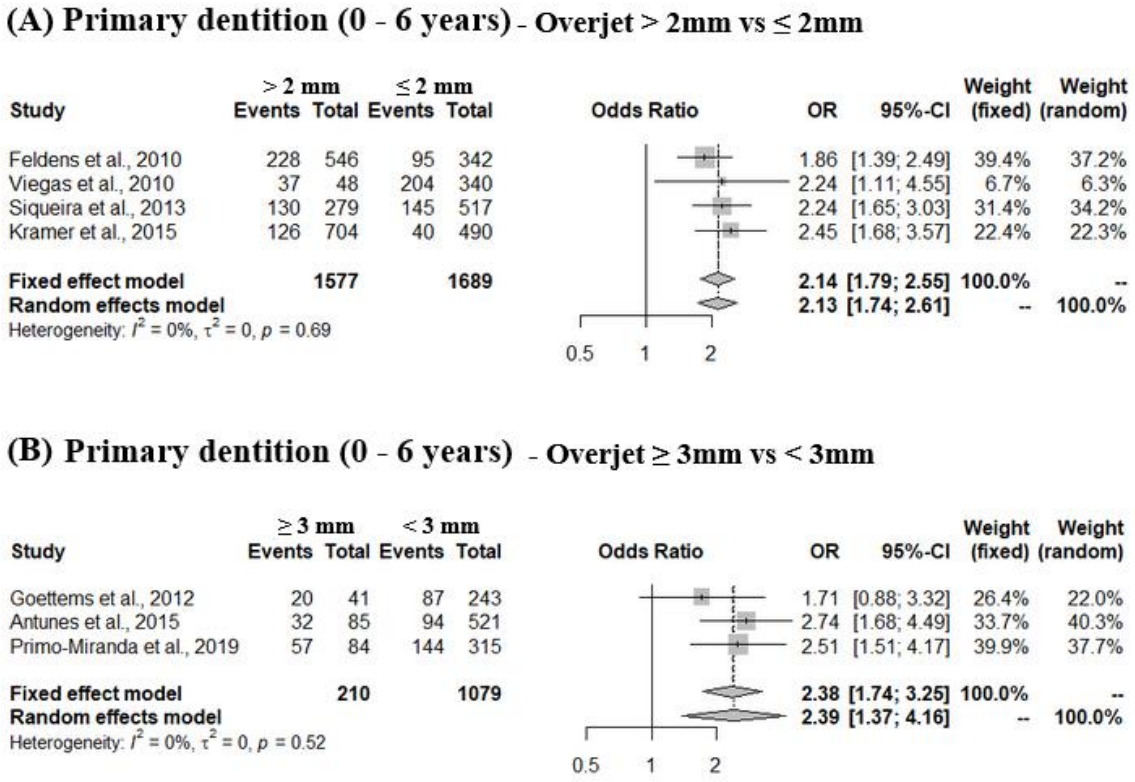

Figure 4. Forest plots of the meta-analyses on the association between increased overjet and dental trauma in the primary dentition, considering the thresholds of (A)> 2 mm and (B) ≥ 3 mm.

The threshold of > 3 mm showed that children and adolescents with overjet > 3 mm are usually more associated with the presence of DT than those with overjet ≤ 3 mm (Figure 5). The analyses showed a statistically significant association for the primary dentition (n= 2,259; OR: 3.11; 95% CI: 2.45 - 3.96; I^2 = 0%), secondary dentition (n= 15,972; OR: 2.15; 95% CI: 1.17 - 3.95; I^2 = 93%), and mixed/permanent dentition (n= 15,231; OR: 1.94; 95% CI: 1.38 – 2.71; I^2 = 86%).

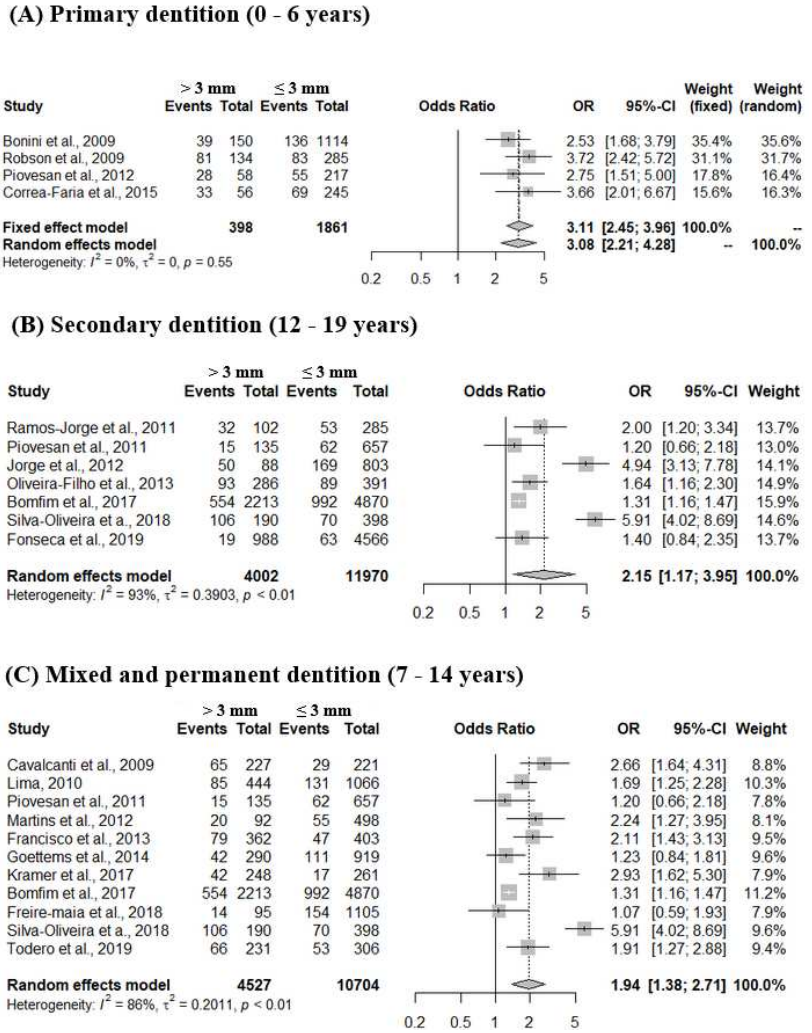

Figure 5. Forest plots of the meta-analyses on the association between increased overjet and dental trauma, considering the threshold of >3 mm. (A) Primary dentition; (B) Mixed/secondary dentitions; (C) Secondary dentition.

The threshold of > 5 mm showed that children and adolescents with overjet > 5 mm are more associated with the presence of DT than those with overjet ≤ 5 mm (Figure 6). For this

outcome, 14 studies were included[5,20,22,23,36,43,45,47,54,58,64,65]. The analysis identified a significant association for the two groups analysed: secondary (n= 12,822; OR: 2.02; 95% CI: 1.37 - 2.96; I^2 = 80%) and mixed/secondary dentition (7 to 14 years) (n= 18,071; OR: 1.99; 95% CI: 1.42 - 2.79; I^2 = 79%).

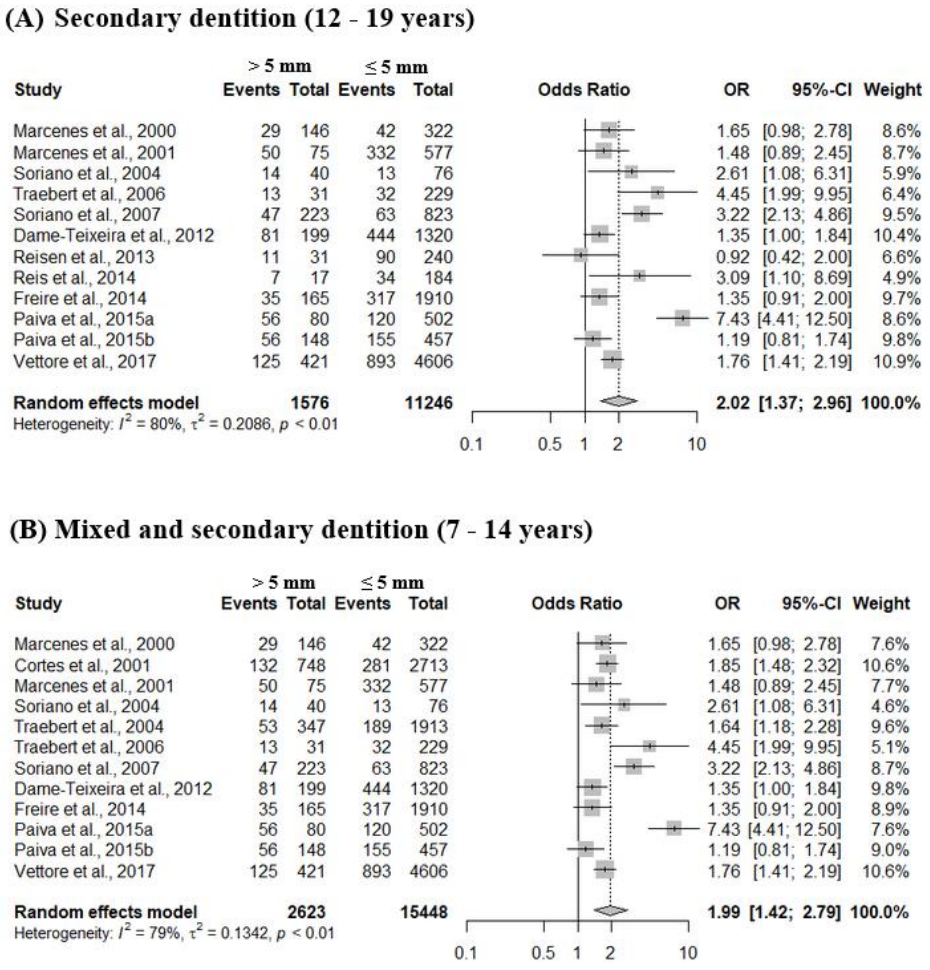

Figure 6. Results of the meta-analyses on the association between increased overjet and dental trauma considering the threshold of >5 mm. (A) Mixed/secondary dentitions and (B) Secondary dentition.

Anterior open bite

Although nine studies were included in the meta-analysis of anterior open bite,[28,29,31,32,35,39,59,60,67] it was not possible to extract data from three studies[30,62,69] and only one study evaluated the secondary dentition.[9] All studies included in the meta-analysis evaluated only

children in the primary dentition. The results (Figure 7) showed a positive association between the presence of anterior open bite and DT (n= 6,696; OR: 1.76; 95% CI: 1.20 - 2.59; I^2 = 81%).

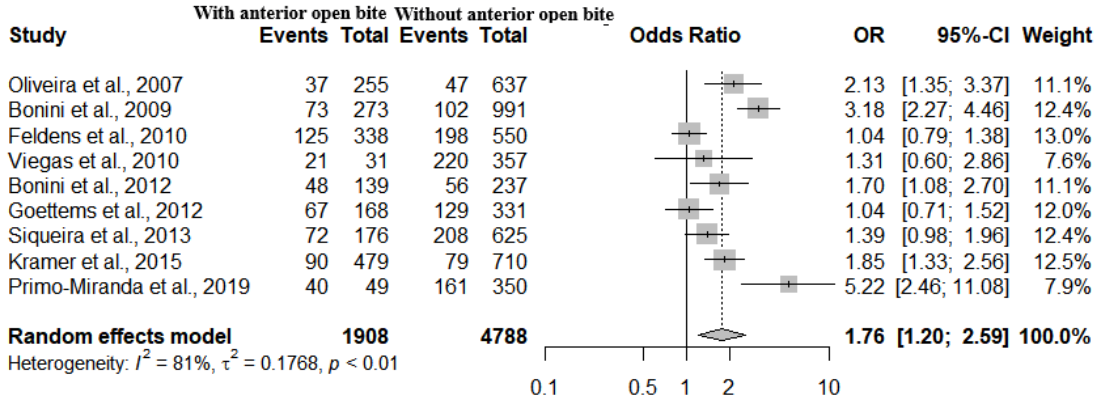

Figure 7. Meta-analysis on the association between anterior open bite and dental trauma in the primary dentition.

Supplementary analysis

Overall, 21 sensitivity tests were performed. All analyses for inadequate lip coverage and increased overjet remained statistically significant in all models. The presence of anterior open bite lost its statistical significance after the sensitivity test that included only studies with a low risk of bias (OR: 1.80; 95% CI: 0.91 - 3.56). The heterogeneity across studies changed from high to moderate or low in six analyses. Supplementary Table 5 shows the details of all sensitivity tests.

Only five analyses had more than 10 articles included in the meta-analysis. Symmetry was observed in all funnel plots and the Egger test did not reveal statistical significance for the publication bias (Supplementary Figures 1 - 5).

Certainty of identified evidence

The GRADE approach was applied in all meta-analyses and showed very low to moderate certainty of evidence. The main limitation was related to inconsistency (8 out of 11 analyses) and imprecision (3 out of 11 analyses). Only one analysis was downgraded due to the risk of bias, but no analysis was downgraded due to indirect evidence or publication bias. Strong

associations were found in six analyses. Supplementary Table 6 shows more details about the evaluation of each GRADE domain.

DISCUSSION

This systematic review and meta-analysis aimed to evaluate the relation between clinical factors and dental trauma in Brazilian children and adolescents. Results showed that children with inadequate lip sealing, increased overjet or anterior open bite have more chances of suffering from some type of dental trauma.

The study of predisposing factors for dental trauma (DT) is not new in the literature and has unique importance for the development of public prevention policies. In Brazil, Soares et al. (2018)[72] conducted a critical review of the risk factors associated with DT in the Brazilian population. They observed that clinical characteristics such as inadequate lip coverage and increased overjet were associated with DT in most of the studies included. However, this systematic review focused only on the age group of 0 to 19 years and it was performed as meta-analyses according to the dentition type and age group, providing more specific results with less heterogeneity. Nevertheless, as observed by Soares et al. (2018),[72] inadequate lip coverage and increased overjet were associated with DT in all the age groups investigated in this review.

Inadequate lip coverage is described as one of the clinical factors most associated with DT. In previous meta-analyses, 12-year-old[1] children in the primary dentition[73] and with inadequate lip coverage were 1.81 to 2.26 times more likely to suffer DT. The present study showed that inadequate lip coverage is associated with DT in all age groups and types of dentition analysed, agreeing with previous studies.[1,73] A point worth noting in this review, which was not shown in previous systematic reviews[1,73], is that inadequate lip coverage remained statistically significant in all the models of sensitivity tests performed, meaning that the results are sufficiently robust to establish this association. Such findings might be justified by the fact that lip sealing works as a natural buffer for the impacts caused at the time of trauma, which prevents dental fractures. Thus, when there is inadequate lip protection, the anterior teeth become more vulnerable to traumatic injuries.

Increased overjet is also a factor associated with DT, regardless of age or dentition type.[74] Arraj et al. (2019)[15] conducted a systematic review including studies from around the world, in which children with severe overjet are 1.81 to 3.85 times more likely to suffer from

some type of DT, depending on the age group and overjet size. Similar results in this study showed children in the primary dentition with an overjet of 2 mm already representing a risk factor for DT, while children in mixed or secondary dentitions with an overjet greater than 3 mm or 5 mm were considered predisposing factors for trauma. Comparable to lip coverage, increased overjet remained significantly associated with DT in all sensitivity test models, which provided reliability to the results of the present study. The association of increased overjet with DT might relate to the fact that anterior teeth are more vulnerable in the dental arch in this condition. Additionally, when increased overjet is associated with inadequate lip coverage, the likelihood of DT becomes even higher.[22]

Moreover, the third characteristic investigated was the presence of anterior open bite. Several primary studies have assessed this condition[9,28-32,35,39,59,60,62,67,69] but this systematic review was the first one to summarize the results in a meta-analysis. Most of the articles included in this review showed a positive association between anterior open bite and the presence of DT, as well as the results summarized in the meta-analysis. Nevertheless, the result of the meta-analysis should be evaluated with caution for several reasons. First, the meta-analysis was composed only of studies evaluating the primary dentition, which hinders the generalization for patients in mixed or secondary dentitions. Second, after the sensitivity test presented only a low risk of bias, the anterior open bite was no longer statistically associated with DT, meaning that the summary effect estimate might be influenced by studies of low methodological quality. Therefore, well-designed studies should be performed to investigate the association between the presence of anterior open bite and the occurrence of DT more accurately, considering important confounding factors and associations with other clinical characteristics.

This study is not free of limitations. The first one concerns the low number of Brazilian states that have performed studies on DT. In a population as heterogeneous as the Brazilian one, more studies must be published in all regions for greater certainty in the generalization of results for the entire country. The second limitation concerns the low number of studies including only children in the mixed dentition, which allowed performing meta-analyses for the group in this dentition stage. Thus, further studies should be conducted to understand DT profiles. Finally, the third limitation can be attributed to the methodological design of most studies, considering that cross-sectional studies do not guarantee a cause-effect relationship and contribute to the high heterogeneity obtained in a large portion of the analyses.

However, this systematic review with a meta-analysis has major strengths. The first one is being the first study to assess risk factors for DT in Brazilian children and adolescents. Moreover, the stratification of results by the type of dentition and age group provides a lower diversity of results. Another strength is that the results of most meta-analyses presented data that are sufficiently robust to not change after the sensitivity tests, providing greater certainty to the findings. Additionally, the extensive literature research allowed including as many eligible studies as possible, which can be seen in the absence of publications determined by the funnel plot and the Egger test. It is also worth noting that this is the first review to apply a systematic meta-analysis to the GRADE approach to assess the certainty of evidence of predisposing factors for DT in different age groups.

Overall, this study showed that the clinical characteristics of children and adolescents are important risk factors for the occurrence of DT in the young Brazilian population. Parents and dentists have key roles in the early detection of these characteristics to allow preventive measures. Orthodontic and speech therapy treatments emerge as essential alternatives to correct these conditions in secondary or mixed dentitions. For children in the primary dentition, in which corrective orthodontic treatment is not possible, parents should be aware of the risk and consequences of dental injuries and the occlusal development of secondary incisors.

CONCLUSION

Inadequate lip coverage and increased overjet are associated with the presence of dental trauma in Brazilian children and adolescents, regardless of dentition type and age group, based on a very low to moderate certainty of evidence. The presence of anterior open bite was associated with dental trauma in children in the primary dentition, but further studies should be conducted to investigate this condition.

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3 CONCLUSÃO

Crianças e adolescentes brasileiros que possuem selamento labial inadequado ou overjet acentuado possuem maiores chances de serem acometidos por traumatismos, independentemente do tipo de dentição e da faixa etária. A presença de mordida aberta anterior também foi associada a traumas dentais em crianças na dentição decídua, entretanto, devido à baixa certeza de evidência, novos estudos devem ser realizados investigando esta associação.

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[*] De acordo com as normas da UNICAMP/FOP, baseadas na padronização do International Committee of Medical Journal Editors - Vancouver Group. Abreviatura dos periódicos em conformidade com o PubMed.

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APÊNDICES

Apêndice 1 – Estratégia de busca nas bases de dados

Database	Search strategy
LILACS http://lilacs.bvsalud.org/	tw:((Traumatic dental injury AND Brazil)) AND (instance:"regional") AND (db:("LILACS"))
	tw:((Trauma Dental and Brasil)) AND (instance:"regional") AND (db:("LILACS"))
	tw:((Tooth Injuries and Brazil)) AND (instance:"regional") AND (db:("LILACS"))
	tw:((Avulsão and Brasil)) AND (instance:"regional") AND (db:("LILACS"))
	tw:((Trauma Maxilofacial and Brasil)) AND (instance:"regional") AND (db:("LILACS"))
	tw:((Maxillofacial injuries and Brazil)) AND (instance:"regional") AND (db:("LILACS"))
SciELO http://www.scielo.org/	Traumatic dental injury AND Brazil
	Tooth Injuries AND Brazil
	Maxillofacial injuries AND Brazil
PubMed http://www.ncbi.nlm.nih.gov/pubmed	("Traumatic dental injury"[All Fields] OR "Traumatic dental injuries"[All Fields] OR "Tooth Injuries"[All Fields] OR "Dental Trauma"[All Fields] OR "Crown Trauma"[All Fields] OR "Tooth Avulsion"[All Fields] OR "Tooth Luxation"[All Fields] OR "Dental injuries"[All Fields] OR "Maxillofacial injuries"[All Fields] OR "maxillofacial trauma"[All Fields] OR "Oral Injuries"[All Fields]) AND ("Brazil"[All Fields] OR "Brazilian"[All Fields])
Scopus http://www.scopus.com/	("Traumatic dental injuries" OR "Tooth Injuries" OR "Dental Trauma" OR "Crown Trauma" OR "Tooth Avulsion" OR "Tooth Luxation" OR "Dental injuries" OR "Maxillofacial injuries" OR "maxillofacial trauma") AND ("Brazil" OR "Brazilian")
Web of Science http://apps.webofknowledge.com/	("Traumatic dental injuries" OR "Tooth Injuries" OR "Dental Trauma" OR "Crown Trauma" OR "Tooth Avulsion" OR "Tooth Luxation" OR "Dental injuries" OR "Maxillofacial injuries" OR "maxillofacial trauma") AND ("Brazil" OR "Brazilian")
Embase https://www.embase.com	('traumatic dental injuries' OR 'tooth injuries' OR 'dental trauma' OR 'crown trauma' OR 'tooth avulsion' OR 'tooth luxation' OR 'dental injuries' OR 'maxillofacial injuries' OR 'maxillofacial trauma') AND ('brazil' OR 'brazilian')
OpenThesis http://www.openthesis.org/	("Traumatic dental injuries" OR "Tooth Injuries" OR "Dental Trauma") AND ("Brazil" OR "Brazilian")
OpenGrey http://www.opengrey.eu/	("Traumatic dental injuries" OR "Tooth Injuries" OR "Dental Trauma")

Apêndice 2 - Lista dos artigos excluídos após leitura na íntegra.

Study	Reason for exclusion	Reference
Beltrão et al., 2007	Did not assess oral characteristics	Beltrao EM, Cavalcanti AL, Albuquerque SS, Duarte RC. Prevalence of dental trauma children aged 1-3 years in Joao Pessoa (Brazil). Eur Arch Paediatr Dent. 2007 Sep;8(3):141-3.
Bendo et al., 2012	Overlapping results/sample	Bendo CB, Vale MP, Figueiredo LD, Pordeus IA, Paiva SM. Social vulnerability and traumatic dental injury among Brazilian schoolchildren: a population-based study. Int J Environ Res Public Health. 2012;9(12):4278-4291.
Berti et al., 2015	Did not assess oral characteristics	Berti GO, Hesse D, Bonifácio CC, Raggio DP, Bönecker MJ. Epidemiological study of traumatic dental injuries in 5- to 6-year-old Brazilian children. Braz Oral Res. 2015;29:1-6.
Bijella et al., 1990	Did not assess oral characteristics	Bijella MF, Yared FN, Bijella VT, Lopes ES. Occurrence of primary incisor traumatism in Brazilian children: a house-by-house survey. ASDC J Dent Child. 1990;57(6):424-427.
Borges et al., 2017	Did not assess oral characteristics	Borges TS, Chaffee BW, Kramer PF, Feldens EG, Vítolo MR, Feldens CA. Relationship between overweight/obesity in the first year of age and traumatic dental injuries in early childhood: Findings from a birth cohort study. Dent Traumatol. 2017;33(6):465-471. doi:10.1111/edt.12377
Carvalho et al., 2012	Did not assess oral characteristics	Carvalho B, Franca C, Heimer M, Vieira S, Colares V. Prevalence of dental trauma among 6-7-yearold children in the city of Recife, PE, Brazil. Braz. J. Oral Sci. 2015;11(1):72-5.
Carvalho et al., 2010	Did not assess oral characteristics	Carvalho ML, Moysés SJ, Bueno RE, Shimakura S, Moysés ST. A geographical population analysis of dental trauma in school-children aged 12 and 15 in the city of Curitiba-Brazil. BMC Health Serv Res. 2010;10:203.
Correa et al., 2011	Did not assess oral characteristics	Correa MB, Torriani DD, Lima FG, Goettems M L, Demarco FF. Dental trauma and physical environment of schools of the city of Pelotas, RS, Brazil. Pesquisa Brasileira em Odontopediatria e Clinica Integrada. 2011;11(2):269-74
Corrêa-Faria et al., 2015	Overlapping results/sample	Corrêa-Faria P, Paixão-Gonçalves S, Paiva SM, Ramos-Jorge ML, Pordeus IA. Case-control study on factors associated with crown fractures in the primary dentition. Braz. oral res. 2015;29(1):1-6.
Costa et al., 2014	Sample with only of traumatized teeth	Costa VP, Bertoldi AD, Baldissera EZ, Goettems ML, Correa MB, Torriani DD. Traumatic dental injuries in primary teeth: severity and related factors observed at a specialist treatment centre in Brazil. Eur Arch Paediatr Dent. 2014;15(2):83-88.
Cunha et al., 2001	Sample with only of traumatized teeth	Cunha RF, Pugliesi DM, de Mello Vieira AE. Oral trauma in Brazilian patients aged 0-3 years. Dent Traumatol. 2001;17(5):210-212.
Silva et al., 2019	Did not assess oral characteristics	da Silva-Júnior IF, Drawanz Hartwig A, Leão Goettems M, Sousa Azevedo M. Is dental trauma more prevalent in maltreated children? A comparative Study in Southern Brazil. Int J Paediatr Dent. 2019;29(3):361-368.
Silveira et al., 2010	Did not assess oral characteristics	Silveira JLGCd, Bona AJ, Arruda ABd. Traumatismos dentários em escolares de 12 anos do município de Blumenau, SC, Brasil. Pesqui bras odontopediatria clín integr. 2010;10(1):23-6.
Feldens et al., 2008	Did not assess oral characteristics	Feldens CA, Kramer PF, Vidal SG, Faraco Junior IM, Vítolo MR. Traumatic dental injuries in the first year of life and associated factors in Brazilian infants. J Dent Child (Chic). 2008;75(1):7-13.
Feldens et al., 2014	Did not assess oral characteristics	Feldens CA, Kramer PF, Feldens EG, Pacheco LM, Vítolo MR. Socioeconomic, behavioral, and anthropometric risk factors for traumatic dental injuries in childhood: a cohort study. Int J Paediatr Dent. 2014;24(3):234-243.
Felix et al., 2014	Did not assess oral characteristics	Exploratory Study of the Prevalence of Traumatic Injuries in Preschool Children in the City of Macapá, Brazil. Pesqui. Bras. Odontopediatr. Clin. Integr 2014;14:71-77.
Frujeri et al., 2015	Overlapping results/sample	Frujeri MDLV, Frujeri JÂJ, Bezerra ACB, Cortes MIDSG. Prevalence, etiology and treatment needs of traumatic dental injuries in schoolchildren aged 12 years at Brasília, Brazil. esquisa Brasileira em Odontopediatria e Clinica Integrada. 2015;15(1):65-73
Granville-Garcia et al.,	Did not assess oral characteristics	Granville-Garcia AF, de Menezes VA, de Lira PI. Dental trauma and associated factors in Brazilian preschoolers. Dent Traumatol. 2006 Dec;22(6):318-22.

2006		
Granville-Garcia et al., 2003	Did not assess oral characteristics	Granville-Garcia, AF. Prevalência e fatores associados ao traumatismo dentário em crianças de 1 a 5 anos da Cidade do Recife. –PE, 2003. 98 p.
Kramer et al., 2003	Did not assess oral characteristics	Kramer PF, Zembruski C, Ferreira SH, Feldens CA. Traumatic dental injuries in Brazilian preschool children. Dent Traumatol. 2003;19(6):299-303.
Kramer et al., 2009	Did not assess oral characteristics	Kramer PF, Gomes CS, Ferreira SH, Feldens CA, Viana ES. Traumatismo na dentição decídua e fatores associados em pré- escolares do município de Canela/RS. Pesqui. bras. odontopediatria clín. Integr. 2009;9(1):95-100
Martins et al., 2013	Did not assess oral characteristics	Martins VM, De Sousa RV, Rocha ES, Leite RB, Clementino MA, Granville-Garcia AF. Comparative analysis of gender: A population-based study on dental trauma. 2013;47(2):147-153
Martins et al., 2014	Did not assess oral characteristics	Martins VM, Sousa RV, Rocha ES, Leite RB, Gomes MC, Granville-Garcia AF. Assessment of the association between overweight/obesity and traumatic dental injury among Brazilian schoolchildren. Acta Odontol Latinoam. 2014;27(1):26-32.
Mestrinho et al., 1998	Did not assess oral characteristics	Mestrinho HD, Bezerra AC, Carvalho JC. Traumatic dental injuries in Brazilian pre-school children. Braz Dent J. 1998;9(2):101-4.
Morales et al., 2006	Did not assess oral characteristics	Morales MOCC, Fraiz FC, Menezes JVNBd, Gugisch RC. Prevalência e características da fratura coronária em incisivos permanentes superiores de escolares em uma cidade do sul do brasil. Arq Cent Estud Curso Odontol Univ Fed Minas Gerais. 2006;43(01):04-8.
Mota et al., 2011	Did not assess oral characteristics	Mota LQ, Targino AGR, Lima MGGC, de Farias JFG, Silva ALA, de Farias FFG. Evaluation of dental trauma in schoolchildren of the city of João Pessoa, PB, Brazil. Pesqui. Bras. Odontopediatr. Clin. Integr. 2011;11(2):217-22.
Nicolau et al. 2001	Did not assess oral characteristics	Nicolau B, Marcenes W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-year-olds in Brazil. Dent Traumatol. 2001 Oct;17(5):213-7.
Nicolau et al., 2003	Did not assess oral characteristics	Nicolau B, Marcenes W, Sheiham A. The relationship between traumatic dental injuries and adolescents' development along the life course. Community Dent Oral Epidemiol. 2003;31(4):306-313.
Oliveira et al., 2016	Did not assess oral characteristics	Oliveira LF, Souza JG, Mendes RI, Oliveira RC, Oliveira Cd.e C, Lima CV, et al. Is there an association between the presence of dental fluorosis and dental trauma amongst school children? Cien Saude Colet. 2016;21(3):967-76.
Oliveira et al., 2010	Did not assess oral characteristics	Oliveira MSBd, Carneiro MC, Amorim TM, Maia VN, Alvarez AV, Vianna MIP, et al. Contexto familiar, traumatismo dentário e oclusopatias em crianças em idade pré-escolar: ocorrência e fatores associados. Rev odontol UNESP (Online). 2010 2010/04;39(2):81-8.
Paiva et al., 2013	Did not assess oral characteristics	Paiva PCP, Paiva HN, Jorge KO, Oliveira Filho PMde. Estudo transversal em escolares de 12 anos de idade sobre a necessidade de tratamento, etiologia e ocorrência de traumatismo dentário em Montes Claros, Brasil. 2013;49(1):19-25.
Paiva et al., 2015	Overlapping results/sample	de Paiva HN, Paiva PC, de Paula Silva CJ, et al. Is there an association between traumatic dental injury and social capital, binge drinking and socioeconomic indicators among schoolchildren?. PLoS One. 2015;10(2):e0118484.
Soriano et al., 2009	Did not assess oral characteristics	Soriano EP, Caldas Ade F Jr, De Carvalho MV, Caldas KU. Relationship between traumatic dental injuries and obesity in Brazilian schoolchildren. Dent Traumatol. 2009;25(5):506-509.
Tavares et al., 2018	Did not assess oral characteristics	Tavares LHS, Ferreira DC, Côrtes AQ, et al. Factors associated with dental fractures in Brazilian individuals. J Investig Clin Dent. 2018;9(4):e12348.
Tovo et al., 2004	Did not assess oral characteristics	Tovo MF, Dos Santos PR, Kramer PF, Feldens CA, Sari GT. Prevalence of crown fractures in 8-10 years old schoolchildren in Canoas, Brazil. Dent Traumatol. 2004;20(5):251-4.
Traebert et al., 2003	Did not assess oral characteristics	Traebert J, Peres MA, Blank V, Böell Rda S, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianópolis, Brazil. Dent Traumatol. 2003 Feb;19(1):15-8.

Wendt et al., 2010	Did not assess oral characteristics	Wendt FP, Torriani DD, Assunção MC, et al. Traumatic dental injuries in primary dentition: epidemiological study among preschool children in South Brazil. Dent Traumatol. 2010;26(2):168-173.

Apêndice 3 - Principais características dos estudos elegíveis

First author, year	City - State, Region	Publication language	Sample analyzed (n)	Age Range (years)	Setting	TDI diagnostic classification system	Clinical factors investigated
Marcenes et al., 2000	Jaraguá do Sul – SC, South	English	476 (225♀ 251♂)	12	Public and private schools	O'Brien	Overjet size and lip coverage
Cortes et al., 2001	Belo Horizonte – MG, Southeast	English	3702 (1973♀ 1729♂)	9-14	Public and private schools	O'Brien	Overjet size and lip coverage
Marcenes et al., 2001	Blumenau – SC, South	English	652 (329♀ 323♂)	12	Public and private schools	O'Brien	Overjet size and lip coverage
Soriano et al., 2004	Recife – PE, Northeast	English	116 (56♀ 60♂)	12	Public and private schools	Andreasen	Overjet size and lip coverage
Trabert et al., 2004	Biguaçu – SC, South	English	2260 (1173♀ 1087♂)	11-13	Public and private schools	O'Brien	Overjet size and lip coverage
Pattussi et al., 2006	Taguatinga and Ceilândia – DF, Central-West	English	1302 (621♀ 681♂)	14-15	Public schools	O'Brien	Overjet size, lip coverage
Traebert et al., 2006	Herval D'Oeste - SC, South	English	260 (135♀ 125♂)	12	Public and private schools	O'Brien	Overjet size, lip coverage
Cecconelo et al., 2007	Luzerna – RS, South	English	159 (73♀ 86♂)	13-14	Public and private schools	O'Brien	Lip coverage
Oliveira et al., 2007	Diadema – SP, Southeast	English	892 (454♀ 438♂)	0-4	National Child Vaccination Day	Ellis	Anterior open bite
Soriano et al., 2007	Recife – PE, Northeast	English	1046 (520♀ 526♂)	12	Public and private schools	Andreasen	Overjet size, lip coverage
Bonini et al., 2009	Diadema – SP, Southeast	English	1265 (614♀ 651♂)	0-4	National Child Vaccination Day	Ellis	Overjet size, lip coverage and anterior open bite
Cavalcanti et al., 2009	Campina Grande – PB, Northeast	English	448 (220♀ 228♂)	7-12	Public schools	Andreasen	Overjet size and lip coverage
Jorge et al., 2009	Belo Horizonte – MG, Southeast	English	519	1-3	National Child Vaccination Day	Andreasen	Lip coverage
Robson et al., 2009	Belo Horizonte – MG, Southeast	English	419 (216♀ 203♂)	0-5	Public and private schools	Hinds and Gregory	Overjet size, lip coverage
Bendo et al., 2010	Belo Horizonte – MG, Southeast	English	1612 (940♀ 672♂)	11-14	Public and private schools	Andreasen	Overjet size
Dutra et al., 2010	Matozinhos – MG, Southeast	English	407 (202♀ 205♂)	1-4	National Child Vaccination Day	Andreasen	Lip coverage
Feldens et al., 2010	Canoas – RS, South	English	888 (419♀ 469♂)	0-5	Public schools	Andreasen	Overjet size, open bite
Granville-Garcia et al., 2010	Caruaru – PE, Northeast	English	820 (394♀ 426♂)	1-5	Public schools	Hinds and Gregory	Lip coverage and open bite
Lima et al., 2010	Alfenas – MG, Southeast	Portuguese	1635 (772♀ 863♂)	7-12	Public and private schools	O'Brien	Overjet size and lip coverage
Traebert et al.,	Palhoça – SC,	Portuguese	405	12	Public and	O'Brien	Lip coverage

2010	South		(194♀ 211♂)		private schools		
Viegas et al., 2010	Belo Horizonte – MG, Southeast	English	388 (169♀ 219♂)	5	Public and private schools	Andreasen	Overjet size, lip coverage, anterior open bite.
Ramos-Jorge et al., 2011	Diamantina – MG, Southeast	English	387 (207♀ 180♂)	12-15	Public schools	O'Brien	Overjet size, lip coverage
Souza-Filho et al., 2011	Teresina – PI, Northeast	Portuguese	220 (117♀ 103♂)	3-5	Private Schools	Andreasen	Overjet size and open bite
Piovesan et al., 2011	Santa Maria – RS, South	English	792 (441♀ 351♂)	12	Public schools	O'Brien	Overjet size, lip coverage
Bonini et al., 2012	Amparo – SP, Southeast	English	376 (191♀ 185♂)	3-4	National Child Vaccination Day	Andreasen	Overjet size, lip coverage, anterior open bite
Goettems et al., 2012	Pelotas – RS, South	English	501 (242♀ 259♂)	2-5	Public and private schools	Andreasen	Overjet size and open bite
Jorge et al., 2012	Belo Horizonte – MG, Southeast	English	891 (539♀ 352♂)	15-19	Public and private schools	Andreasen	Overjet size
Martins et al., 2012	Campina Grande – PB, Northeast	English	590 (315♀ 275♂)	7-14	Public schools	O'Brien	Overjet size, lip coverage
Piovesan et al., 2012	Santa Maria – RS, South	English	441 (204♀ 237♂)	1-4	National Child Vaccination Day	O'Brien	Overjet size, lip coverage
Damé-Teixeira et al., 2012	Porto Alegre – RS, South	English	1528 (758♀ 770♂)	12	Public and private schools	O'Brien	Overjet size, lip coverage
Carvalho et al., 2013	Recife – PE, Northeast	Portuguese	148 (94♀ 54♂)	15-19	Public and private schools	Andreasen	Overjet size, lip coverage
Francisco et al., 2013	Anápolis – GO, Central-West	English	765 (418♀ 347♂)	9-14	Public schools	O'Brien	Overjet size, lip coverage
Oliveira-Filho et al., 2013	Diamantina – MG, Southeast	English	687 (389♀ 298♂)	14-19	Public and private schools	Glendor	Overjet size
Reisen et al., 2013	Valinhos – SP, Southeast	English	379 (222♀ 150♂)	13-19	Public schools	SBBrasil 2010	Overjet size
Siqueira et al., 2013	Campina Grande – PB, Northeast	English	814 (392♀ 422♂)	3-5	Public and private schools	Andreasen	Overjet size, lip coverage, anterior open bite
Reis et al., 2014	Diamantina – MG, Southeast	English	207 (130♀ 77♂)	11-19	Public and private schools	Andreasen	Overjet size
Freire et al., 2014	Goiania – GO, Central-West	English	2075 (1053♀ 1022♂)	12	Public and private schools	SBBrasil 2010	Overjet size
Frujeri et al., 2014	Brasília – DF, Central-West	English	1118 (582♀ 536♂)	12	Public and private schools	O'Brien	Overjet size, lip coverage
Goettems et al., 2014	Pelotas – RS, South	English	1210 (636♀ 574♂)	8-12	Public and private schools	O'Brien	Overjet size, lip coverage
Paiva et al. et al., 2014	Diamantina – MG, Southeast	English	101 (54♀ 47♂)	12	Public and private schools	Andreasen	Overjet size, lip coverage
Antunes et al., 2015	Nova Friburgo – RJ, Southeast	English	606 (287♀ 319♂)	2-5	Public schools	OMS	Overjet size
Correa-Faria et al., 2015	Diamantina – MG, Southeast	English	301 (145♀ 156♂)	1-5	National Child Vaccination Day	Andreasen	Overjet size and lip coverage
Kramer et al., 2015	Canoas – RS, South	English	1316 (632♀ 684♂)	0-5	Public schools	Andreasen	Overjet size, anterior open bite
Paiva et al.,	Diamantina – MG,	English	588 (302♀	12	Public and	Andreasen	Overjet size

2015a	Southeast		286♂)		private schools		and lip coverage
Paiva et al., 2015b	Montes Claros – MG, Southeast	English	605 (295♀ 310♂)	12	Public and private schools	O'Brien	Overjet size, lip coverage
Agostini et al., 2016	Santa Maria – RS, South	English	1640 (791♀ 849♂)	0-4	National Child Vaccination Day	O'Brien	Lip coverage
Tello et al., 2016	Diadema – SP, Southeast	English	2002 – 779 2004 – 925 2006 – 1014 2008 – 1198 2010 – 1258 2012 – 1215	1-4	National Child Vaccination Day	Andreasen	Lip coverage, anterior open bite
Kramer et al., 2017	Osório – RS, South	English	509 (291♀ 218♂)	11-14	Public schools	Andreasen	Overjet size
Vettore et al., 2017	All brazilian states	English	5027 (2512♀ 2517♂	12	Home	O'Brien	Overjet size
Bomfim et al., 2017	All brazilian states	English	7240 (3642♀ 3598♂)	12	Home	SBBrasil	Overjet size and open bite
Freire-Maia et al., 2018	Belo Horizonte – MG, Southeast	English	1201 (536♀ 665♂)	8-10	Public and private schools	Andreasen	Overjet size
Silva-Oliveira et al., 2018	Diamantina – MG, Southeast	English	588 (302♀ 286♂)	12	Public and private schools	Andreasen	Overjet size
Fonseca et al., 2019	178 municipalities from Sao Paulo - SP	English	5558	15-19	Home	WHO	Overjet size
Primo-Miranda et al., 2019	Diamantina – MG, Southeast	English	400 (224♀ 176♂)	3-5	Public and private schools	Andreasen	Overjet size and anterior open bite
Todero et al., 2019	Campo Magro – PR, South	English	537 (292♀ 245♂)	8-10	Public schools	Andreasen	Overjet size

Apêndice 4 - Avaliação do risco de viés pela ferramenta de Folks e Fulton (continua).

Guideline	Checklist	Marcenes et al., 2000	Cortes et al., 2001	Marcenes et al., 2001	Soriano et al., 2004	Trabert et al., 2004	Pattussi et al., 2006	Traebert et al., 2006	Cecconelo et al., 2007	Oliveira et al., 2007	Soriano et al., 2007	Bonini et al., 2009	Cavalcanti et al., 2009	Jorge et al., 2009
Study design appropriate to objective?	Prevalence (Cross-sectional)	0	0	0	0	0	0	0	N/A	0	0	0	0	0
	Prognosis (Cohort)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treatment (Controlled trial)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cause (Cohort, case-control, cross-sectional)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
Study sample representative?	Source of sample	0	0	0	0	0	+	0	0	0	0	0	0	0
	Sampling method	0	0	0	++	0	0	0	0	+	0	+	0	+
	Sample size	0	0	0	++	0	0	0	0	0	0	0	0	0
	Entry criteria/ exclusions	++	++	++	++	++	++	++	0	++	++	++	++	++
	Non-respondents	0	0	0	0	0	0	0	0	0	0	0	0	0
Control group acceptable?	Definition of controls	0	0	0	0	0	0	++	0	0	0	0	0	0
	Source of controls	0	0	0	0	0	+	0	0	0	0	0	0	0
	Matching/ randomization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Comparable characteristics	0	0	0	0	0	0	0	0	0	0	0	0	0
Quality of measurements and outcomes?	Validity	0	0	0	0	0	0	+	0	0	0	0	0	0
	Reproducibility	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blindness	+	+	+	+	+	+	+	+	+	+	+	+	+
	Quality control	0	0	0	0	0	0	0	0	0	0	0	0	0
Completeness?	Compliance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Dropouts and Deaths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	+	N/A	N/A	N/A	N/A	N/A
	Missing data	0	0	0	0	0	++	0	0	0	0	0	0	0
Distorting influences?	Extraneous treatments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Contamination	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Changes over time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Confounding factors	++	+	+	++	+	+	+	++	+	++	++	++	+
	Distortion reduced by analysis	++	0	0	++	0	0	0	++	0	++	++	++	+
Summary Questions	Bias - Are the results erroneously biased in a certain direction?	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No
	Confounding - Are there any serious confounding or other distorting influences?	Yes	No	No	Yes	No	No	No	Yes	No	Yes	Yes	Yes	No
	Chance - Is it likely that the results occurred by chance?	No	No	No	Yes	No	No	No	No	No	No	No	No	No

(++) - Major problems. (+) - Minor problems. (0) - No problems. (N/A) - The criteria were not applicable.

Apêndice 4 - Avaliação do risco de viés pela ferramenta de Folks e Fulton (continua).

Guideline	Checklist	Robson et al., 2009	Bendo et al., 2010	Dutra et al., 2010	Feldens et al., 2010	Granville-Garcia et al., 2010	Lima et al., 2010	Traebert et al., 2010	Viegas et al., 2010	Ramos-Jorge et al., 2011	Souza-Filho et al., 2011	Piovesan et al., 2011	Bonini et al., 2012	Goettems et al., 2012
Study design appropriate to objective?	Prevalence (Cross-sectional)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prognosis (Cohort)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treatment (Controlled trial)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cause (Cohort, case-control, cross-sectional)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Study sample representative?	Source of sample	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sampling method	0	0	0	++	++	++	0	+	0	++	0	+	+
	Sample size	0	0	0	0	++	0	0	0	0	++	0	0	0
	Entry criteria/ exclusions	0	++	++	0	++	++	++	0	++	++	++	++	0
	Non-respondents	0	0	0	0	0	0	0	0	0	0	0	0	0
Control group acceptable?	Definition of controls	0	0	0	++	0	++	0	0	++	0	0	0	0
	Source of controls	0	0	0	0	0	0	0	0	0	0	0	0	0
	Matching/ randomization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Comparable characteristics	0	0	0	0	0	0	0	0	0	0	0	0	0
Quality of measurements and outcomes?	Validity	0	0	0	+	0	+	0	0	+	0	0	0	0
	Reproducibility	0	0	0	0	0	0	0	0	0	0	0	++	0
	Blindness	+	+	+	+	+	+	+	+	+	+	+	+	+
	Quality control	0	0	0	0	0	0	0	0	0	0	0	+	0
Completeness?	Compliance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Dropouts and Deaths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Missing data	0	0	0	0	0	0	0	0	0	0	0	0	0
Distorting influences?	Extraneous treatments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Contamination	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Changes over time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Confounding factors	+	+	+	+	++	++	++	++	++	++	+	+	++
	Distortion reduced by analysis	0	0	0	0	++	++	++	++	++	++	0	0	++
Summary Questions	Bias - Are the results erroneously biased in a certain direction?	No	No	No	No	Yes	Yes	No	No	Yes	Yes	No	Yes	No
	Confounding - Are there any serious confounding or other distorting influences?	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
	Chance - Is it likely that the results occurred by chance?	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No

(++) - Major problems. (+) - Minor problems. (0) - No problems. (N/A) - The criteria were not applicable.

Apêndice 4 - Avaliação do risco de viés pela ferramenta de Folks e Fulton (continua).

Guideline	Checklist	Jorge et al., 2012	Martins et al., 2012	Piovesan et al., 2012	Damé-Teixeira et al., 2012	Carvalho et al., 2013	Francisco et al., 2013	Oliveira-Filho et al., 2013	Reisen et al., 2013	Siqueira et al., 2013	Reis et al., 2014	Freire et al., 2014	Frujeri et al., 2014	Goettems et al., 2014
Study design appropriate to objective?	Prevalence (Cross-sectional)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Prognosis (Cohort)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treatment (Controlled trial)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cause (Cohort, case-control, cross-sectional)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Study sample representative?	Source of sample	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sampling method	0	0	0	+	++	0	0	+	0	0	0	++	0
	Sample size	0	0	0	0	++	0	0	0	0	++	0	0	0
	Entry criteria/ exclusions	0	0	++	0	++	0	++	0	0	++	++	++	++
	Non-respondents	0	0	0	0	0	0	0	0	0	0	0	0	0
Control group acceptable?	Definition of controls	0	0	0	0	0	0	0	0	0	0	0	0	0
	Source of controls	0	0	0	0	0	0	0	0	0	0	0	0	0
	Matching/ randomization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Comparable characteristics	0	0	0	0	0	0	0	0	0	0	0	0	0
Quality of measurements and outcomes?	Validity	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reproducibility	0	0	0	0	++	0	0	0	0	0	0	++	0
	Blindness	+	+	+	+	+	+	+	+	+	+	+	+	+
	Quality control	0	0	0	0	++	0	0	0	0	0	0	+	0
Completeness?	Compliance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Dropouts and Deaths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Missing data	0	0	0	0	0	0	0	0	0	0	0	+	0
Distorting influences?	Extraneous treatments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Contamination	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Changes over time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Confounding factors	+	+	+	+	++	++	+	++	+	+	+	+	+
	Distortion reduced by analysis	0	0	0	0	++	++	0	++	0	0	0	0	0
Summary Questions	Bias - Are the results erroneously biased in a certain direction?	No	No	No	No	Yes	No	No	No	No	No	No	No	No
	Confounding - Are there any serious confounding or other distorting influences?	No	No	No	No	Yes	Yes	No	Yes	No	No	No	No	No
	Chance - Is it likely that the results occurred by chance?	No	No	No	No	Yes	No	No	No	No	No	No	No	No

(++) - Major problems. (+) - Minor problems. (0) - No problems. (N/A) - The criteria were not applicable.

Apêndice 4 - Avaliação do risco de viés pela ferramenta de Folks e Fulton (continua).

Guideline	Checklist	Paiva et al. et al., 2014	Antunes et al., 2015	Correia-Faria et al., 2015	Kramer et al., 2015	Paiva et al., 2015a	Paiva et al., 2015b	Agostini et al., 2016	Tello et al., 2016	Kramer et al., 2017	Vettore et al., 2017	Bomfim et al., 2017	Freire-Maia et al., 2018
Study design appropriate to objective?	Prevalence (Cross-sectional)	0	0	0	0	0	0	0	0	0	0	0	0
	Prognosis (Cohort)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treatment (Controlled trial)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cause (Cohort, case-control, cross-sectional)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Study sample representative?	Source of sample	0	0	0	0	0	0	0	0	0	++	++	0
	Sampling method	++	+	+	++	+	0	+	++	0	++	++	+
	Sample size	++	0	0	0	0	0	0	0	0	0	0	0
	Entry criteria/ exclusions	0	0	0	++	++	0	++	++	0	0	0	0
	Non-respondents	0	0	0	0	0	0	0	0	0	0	0	0
Control group acceptable?	Definition of controls	0	0	0	0	0	0	0	0	0	0	0	0
	Source of controls	0	0	0	0	0	0	0	0	0	++	++	0
	Matching/ randomization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Comparable characteristics	0	0	0	0	0	0	0	0	0	0	0	0
Quality of measurements and outcomes?	Validity	0	0	0	0	0	0	0	0	0	0	0	0
	Reproducibility	0	0	0	0	+	0	0	0	0	++	++	0
	Blindness	+	+	+	+	+	+	+	+	+	+	+	+
	Quality control	0	+	0	+	0	0	+	0	0	0	0	0
Completeness?	Compliance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Dropouts and Deaths	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Missing data	0	0	0	0	0	0	+	0	0	0	+	0
Distorting influences?	Extraneous treatments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Contamination	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Changes over time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Confounding factors	++	+	+	+	+	+	+	+	+	+	+	+
	Distortion reduced by analysis	++	0	0	0	0	0	+	0	0	0	0	0
Summary Questions	Bias - Are the results erroneously biased in a certain direction?	No	No	No	No	No	No	No	No	No	No	No	No
	Confounding - Are there any serious confounding or other distorting influences?	Yes	No	No	No	No	No	No	No	No	No	No	No
	Chance - Is it likely that the results occurred by chance?	No	No	No	No	No	No	No	No	No	No	No	No

(++) - Major problems. (+) - Minor problems. (0) - No problems. (N/A) - The criteria were not applicable.

Apêndice 4 - Avaliação do risco de viés pela ferramenta de Folks e Fulton (final).

Guideline	Checklist	Silva-Oliveira et al., 2018	Todero et al., 2019	Fonseca et al., 2019	Primo-Miranda et al., 2019
Study design appropriate to objective?	Prevalence (Cross-sectional)	0	0	0	N/A
	Prognosis (Cohort)	N/A	N/A	N/A	N/A
	Treatment (Controlled trial)	N/A	N/A	N/A	N/A
	Cause (Cohort, case-control, cross-sectional)	N/A	N/A	N/A	0
Study sample representative?	Source of sample	0	0	0	0
	Sampling method	+	+	++	+
	Sample size	++	0	++	0
	Entry criteria/ exclusions	0	0	0	0
	Non-respondents	0	0	0	0
Control group acceptable?	Definition of controls	0	0	0	0
	Source of controls	0	0	0	0
	Matching/ randomization	N/A	N/A	N/A	0
	Comparable characteristics	0	0	0	0
Quality of measurements and outcomes?	Validity	0	0	0	0
	Reproducibility	0	0	+	0
	Blindness	+	+	+	+
	Quality control	0	0	0	0
Completeness?	Compliance	N/A	N/A	N/A	N/A
	Dropouts and Deaths	N/A	N/A	N/A	N/A
	Missing data	0	0	+	0
Distorting influences?	Extraneous treatments	N/A	N/A	N/A	N/A
	Contamination	N/A	N/A	N/A	N/A
	Changes over time	N/A	N/A	N/A	N/A
	Confounding factors	+	+	+	0
	Distortion reduced by analysis	0	0	0	0
Summary Questions	Bias - Are the results erroneously biased in a certain direction?	No	No	No	No
	Confounding - Are there any serious confounding or other distorting influences?	No	No	No	No
	Chance - Is it likely that the results occurred by chance?	No	No	No	No

(++) - Major problems. (+) - Minor problems. (0) - No problems. (N/A) - The criteria were not applicable.

Apêndice 5 – Resumo de todas as meta-análises realizadas no estudo.

Dentition (Age Range)	Exposure	No. of studies	Pooled odds ratio (95% CI)	I² test
Primary (0 – 6 years)	Inadequate lip coverage	10†	1.86 (1.24 – 2.79)[a]	75%
		9‡	1.66 (1.23 – 2.24)[a]	63%
		6§	2.17 (1.10 – 4.27)[a]	74%
	Overjet > 2 mm	4†	2.13 (1.74 – 2.61)[a]	0%
		4†	2.14 (1.79 – 2.55)[b]	0%
	Overjet ≥ 3 mm	3†	2.39 (1.37 – 4.16)[a]	0%
		3†	2.38 (1.74 – 3.25)[b]	0%
	Overjet > 3 mm	4†	3.08 (2.21 – 4.28)[a]	0%
		4†	3.11 (2.45 – 3.96)[b]	0%
		3§	3.43 (2.31 – 5.09)[a]	0%
		3§	3.44 (2.54 – 4.65)[b]	0%
	Anterior open bite	9†	1.76 (1.20 – 2.59)[a]	81%
		5§	1.80 (0.91 – 3.56)[a]	81%
Mixed and Secondary (7 – 14 years)	Inadequate lip coverage	20†	2.36 (1.61 – 3.46)[a]	91%
		16‡	1.81 (1.37 – 2.39)[a]	73%
		12§	2.04 (1.33 – 3.15)[a]	91%
		10¶	1.51 (1.26 – 1.82)[a]	50%
	Overjet > 3 mm	11†	1.94 (1.38 – 2.71)[a]	86%
		10‡	1.69 (1.34 – 2.14)[a]	64%
		8§	1.88 (1.15 – 3.07)[a]	89%
		7¶	1.53 (1.12 – 2.09)[a]	55%
	Overjet > 5 mm	12†	1.99 (1.42 – 2.79)[a]	79%
		11‡	1.75 (1.39 – 2.19)[a]	57%
		10§	1.87 (1.27 – 2.74)[a]	80%
		9¶	1.61 (1.33 – 1.95)[a]	37%
Secondary (12 – 19 years)	Inadequate lip coverage	16†	2.08 (1.36 – 3.19)[a]	90%
		14‡	1.67 (1.18 – 2.36)[a]	74%
		8§	2.16 (1.08 – 4.30)[a]	94%
		6¶	1.31 (1.11 – 1.53)[a]	0%
	Overjet > 3 mm	7†	2.15 (1.17 – 3.95)[a]	93%
		6‡	1.80 (1.05 – 3.11)[a]	85%
		6§	2.18 (1.03 – 4.61)[a]	94%
	Overjet > 5 mm	12†	2.02 (1.37 – 2.96)[a]	80%
		11‡	1.74 (1.30 – 2.33)[a]	62%
		9§	2.00 (1.24 – 3.22)[a]	82%
		8¶	1.59 (1.21 – 2.10)[a]	45%

†- Crude meta-analysis with all studies; ‡ - Sensitivity analysis removing outlier; § - Sensitivity analysis including only studies with low risk of bias; ¶ - Sensitivity analysis including only studies with low risk of bias and removing outlier; [a] – Random-effect model; [b] – Fixed-effect model.

Apêndice 6 – Sumário da avaliação da certeza de evidência dos desfechos avaliados.

Certainty assessment							No. of patients		Effect		Certainty
No. of studies	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**With exposition**	**Without exposition**	**Relative (95% CI)**	**Absolute (95% CI)**	
Inadequate lip coverage vs Adequate lip coverage – Primary dentition (0 – 6 years)											
10	observational studies	not serious[a]	serious[b]	not serious[c]	serious[d]	none	468/1240 (37.7%)	1284/4440 (28.9%)	OR 1.86 (1.24 to 2.79)	142 more per 1.000 (from 46 more to 242 more)	⊕◯◯◯ VERY LOW
Inadequate lip coverage vs Adequate lip coverage – Mixed or secondary dentition (7 – 14 years)											
20	observational studies	not serious[a]	serious[b]	not serious[c]	not serious[e]	strong association	1263/4763 (26.5%)	2051/13426 (15.3%)	OR 2.36 (1.61 to 3.46)	146 more per 1.000 (from 72 more to 231 more)	⊕⊕◯◯ LOW
Inadequate lip coverage vs Adequate lip coverage – Secondary dentition (12 – 19 years)											
16	observational studies	not serious[a]	serious[b]	not serious[c]	not serious[e]	strong association	814/2258 (36.0%)	1380/6469 (21.3%)	OR 2.08 (1.36 to 3.19)	147 more per 1.000 (from 56 more to 250 more)	⊕⊕◯◯ LOW
Increased overjet (> 2mm) vs Normal overjet (≤ 2mm) - Primary dentition (0 – 6 years)											
4	observational studies	not serious[a]	not serious[f]	not serious[c]	not serious[e]	strong association	521/1577 (33.0%)	484/1689 (28.7%)	OR 2.14 (1.79 to 2.55)	176 more per 1.000 (from 132 more to 219 more)	⊕⊕⊕◯ MODERATE
Increased overjet (≥ 3mm) vs Normal overjet (< 3mm) - Primary dentition (0 – 6 years)											
3	observational studies	not serious[a]	not serious[f]	not serious[c]	not serious[c]	strong association	109/210 (51.9%)	325/1079 (30.1%)	OR 2.38 (1.74 to 3.25)	205 more per 1.000 (from 127 more to 282 more)	⊕⊕⊕◯ MODERATE
Increased overjet (> 3mm) vs Normal overjet (≤ 3mm) - Primary dentition (0 – 6 years)											

4	observational studies	not serious[a]	not serious[f]	not serious[c]	not serious[c]	strong association	181/398 (45.5%)	343/1861 (18.4%)	OR 3.11 (2.45 to 3.96)	228 more per 1.000 (from 172 more to 288 more)	⊕⊕⊕◯ MODERATE
Increased overjet (> 3mm) vs Normal overjet (≤ 3mm) - Mixed or secondary dentition (7 – 14 years)											
11	observational studies	not serious[a]	serious[b]	not serious[c]	not serious[e]	none	1088/4527 (24.0%)	1721/10704 (15.1%)	OR 1.94 (1.38 to 2.71)	110 more per 1.000 (from 48 more to 181 more)	⊕◯◯◯ VERY LOW
Increased overjet (> 3mm) vs Normal overjet (≤ 3mm) - Secondary dentition (12 – 19 years)											
7	observational studies	not serious[a]	serious[b]	not serious[c]	serious[d]	none	869/4002 (21.7%)	1498/11970 (12.5%)	OR 2.15 (1.17 to 3.95)	110 more per 1.000 (from 18 more to 236 more)	⊕◯◯◯ VERY LOW
Increased overjet (> 5mm) vs Normal overjet (≤ 5mm) - Mixed or secondary dentition (7 – 14 years)											
12	observational studies	not serious[a]	serious[b]	not serious[c]	not serious[e]	none	691/2623 (26.3%)	2881/15448 (18.6%)	OR 1.99 (1.42 to 2.79)	127 more per 1.000 (from 59 more to 204 more)	⊕◯◯◯ VERY LOW
Increased overjet (> 5mm) vs Normal overjet (≤ 5mm) - Secondary dentition (12 – 19 years)											
12	observational studies	not serious[a]	serious[b]	not serious[c]	not serious[e]	strong association	524/1576 (33.2%)	2535/11246 (22.5%)	OR 2.02 (1.37 to 2.96)	145 more per 1.000 (from 60 more to 237 more)	⊕⊕◯◯ LOW
With anterior open bite vs Without anterior open bite – Primary dentition (0 – 6 years)											
9	observational studies	serious[h]	serious[b]	not serious[c]	serious[d]	none	573/1908 (30.0%)	1200/4788 (25.1%)	OR 1.76 (1.20 to 2.59)	120 more per 1.000 (from 36 more to 214 more)	⊕◯◯◯ VERY LOW

CI, confidence interval; OR, odds ratio.

[a] – Most of the eligible studies had a low risk of bias; there was no change in the effect estimate after sensibility test removing studies with some risk of bias.

[b] – High unexplained statistical heterogeneity (I2 > 50%) and/or no overlapping of effect estimates – Rated down by one level.

[c] – Evidence stems from studies with the population suitable for PICO.

[d] – Confidence interval suggests trivial association in one extreme and strong association in other – Rated down by one level.

[e] – The number of events is greater than 400, reaching the optimal information size (OIS) and confidence interval suggests moderate to strong association in both extremes

[f] – Low heterogeneity ($I^2 < 25\%$).

[g] - There was a change in the significance of the effect estimate after the removal of studies with risk of bias - Downgraded by one level.

GRADE Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.

Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

Apêndice 7 – Avaliação do viés de publicação (Funnel plot e Eeger's test)

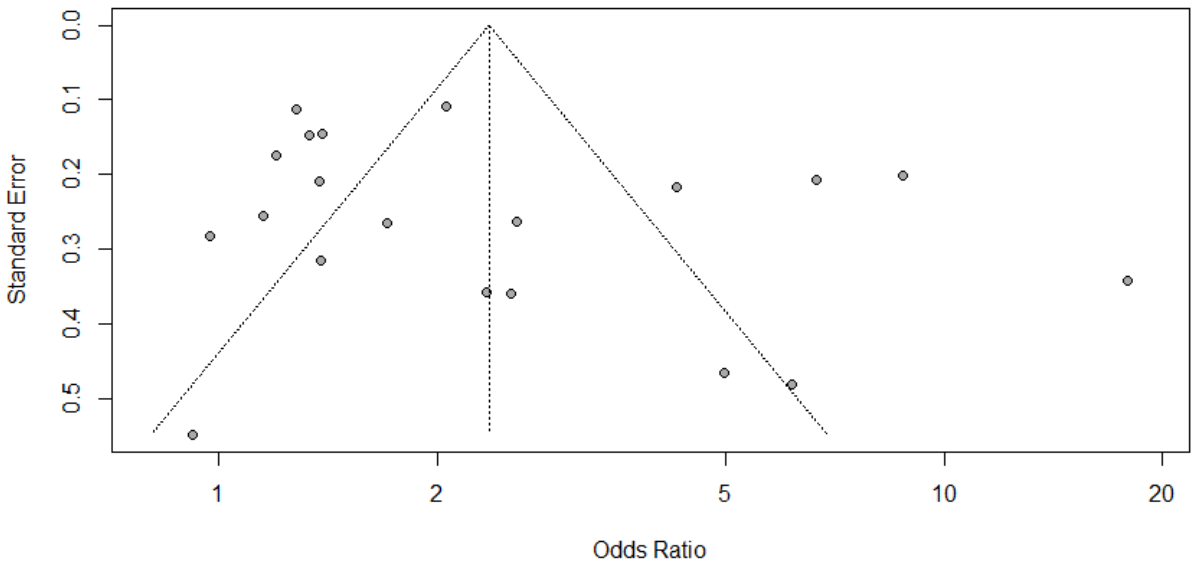


Figura suplementar 1 – Gráfico de funil para a avaliação do selamento labial nas dentições mista/permanente (Egger's test – p = 0.16569)

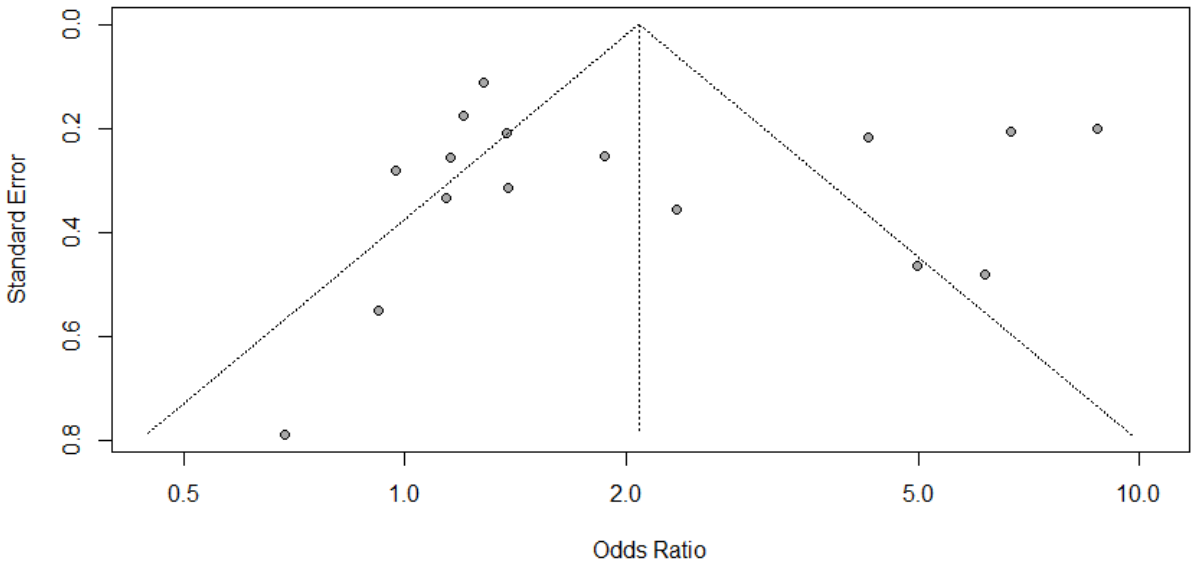


Figura suplementar 2 – Gráfico de funil para a avaliação do selamento labial na dentição permanente (Egger's test – p = 0.67968)

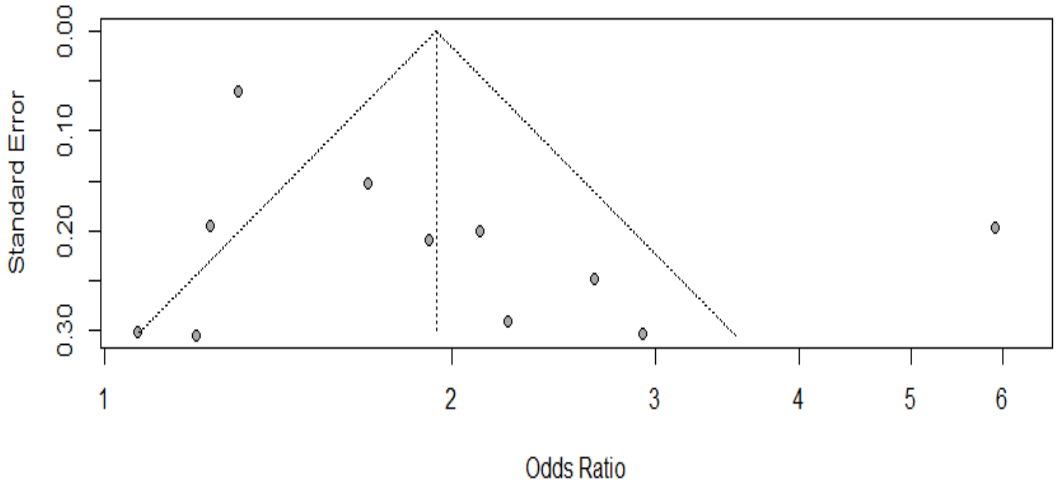


Figura suplementar 3 – Gráfico de funil para a avaliação do overjet > 3mm na dentição mista/permanente (Egger's test – p = 0.10719)

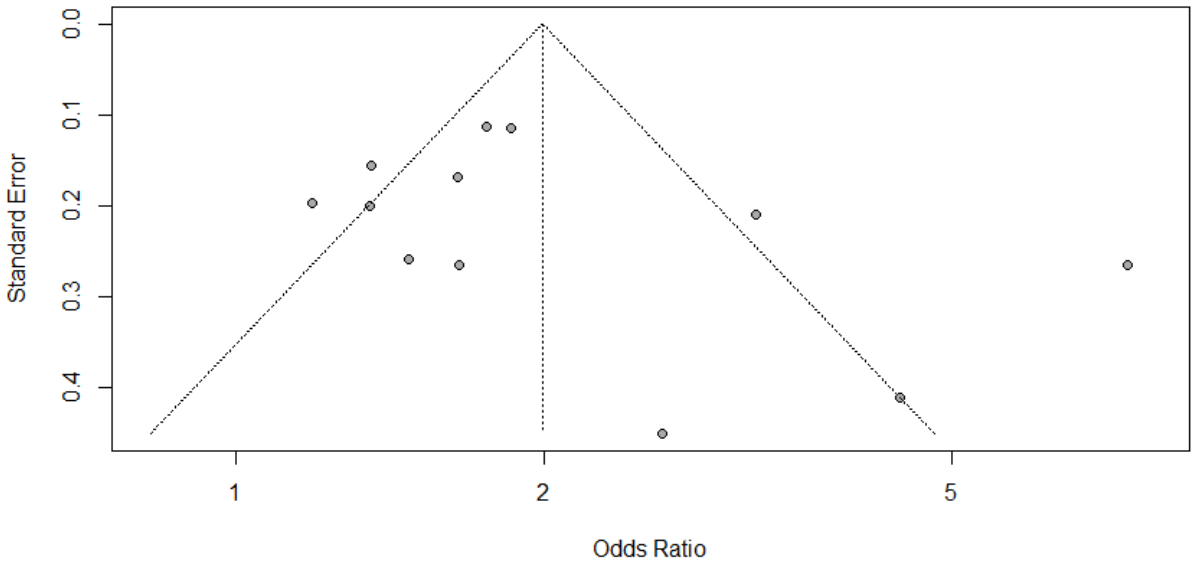


Figura suplementar 4 – Gráfico de funil para a avaliação do overjet > 5 mm na dentição mista/permanente (Egger's test – p = 0.2281)

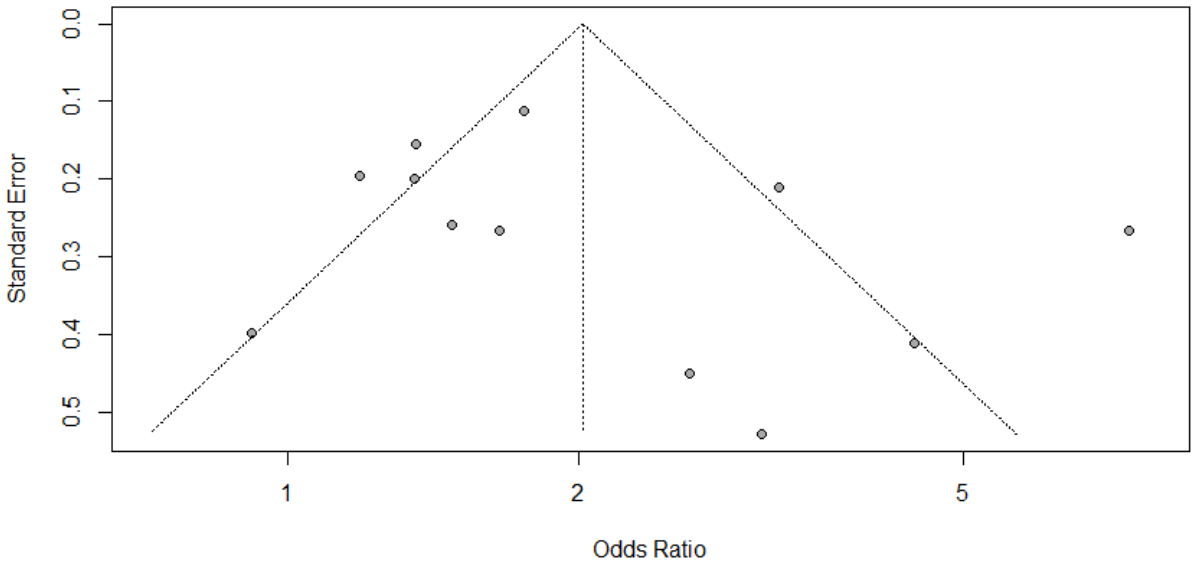
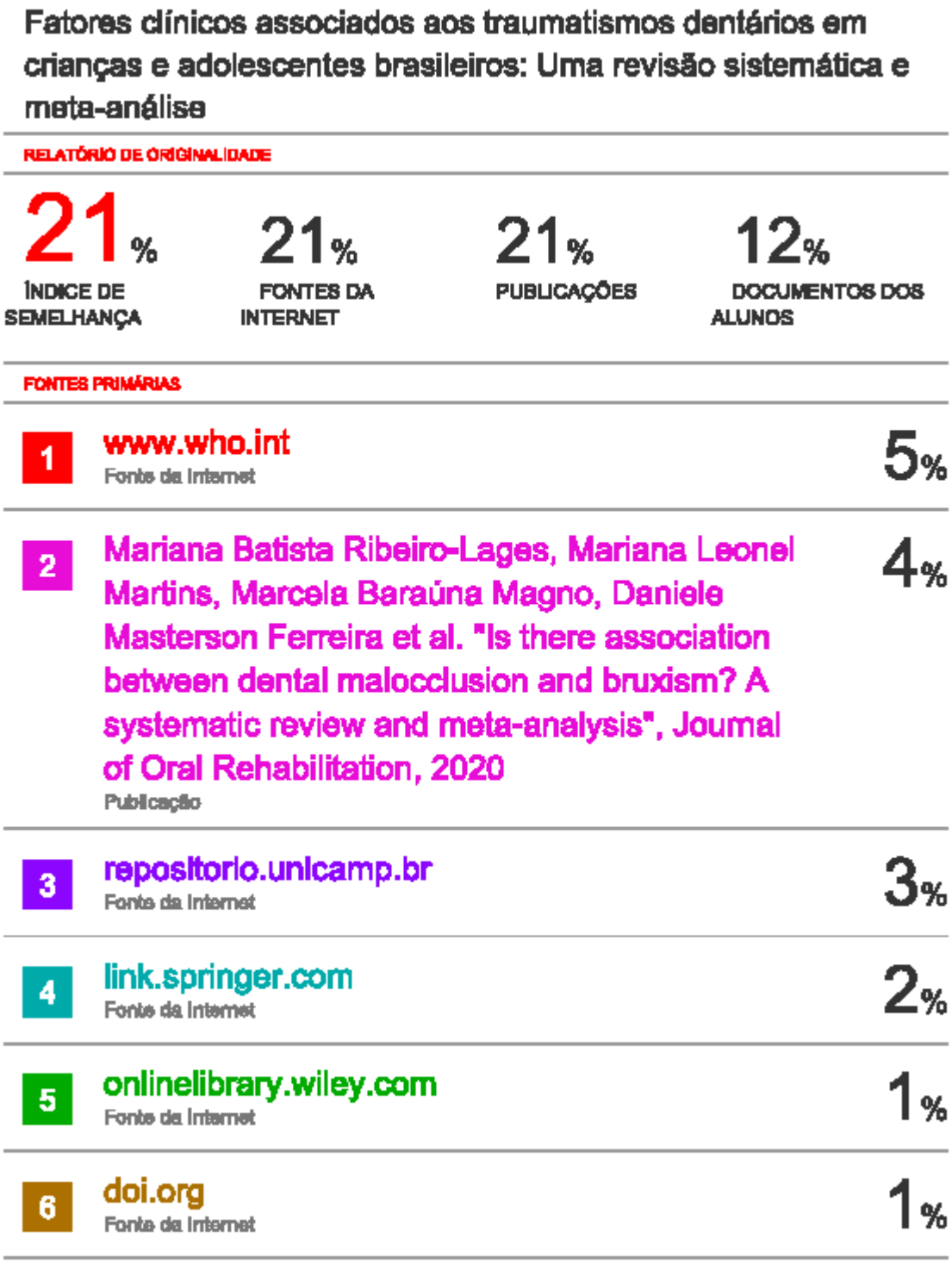


Figura suplementar 5 – Gráfico de funil para a avaliação do overjet > 5mm na dentição permanente (Egger's test – p = 0.32938)

ANEXOS

Anexo 1 - Relatório de verificação de originalidade e prevenção de plágio.



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Anexo 2 - Comprovante de submissão do artigo

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CC:

Subject: Dental Traumatology Author Submission Confirmation - Manuscript ID DT-10-20-COM-4780

Body: 15-Oct-2020

Dear author of "Clinical factors related to dental trauma in brazilian children and adolescents – A systematic review and meta-analysis",

The manuscript entited "Clinical factors related to dental trauma in brazilian children and adolescents – A systematic review and meta-analysis" has been successfully submitted by Dr Walbert Vieira to Dental Traumatology and will shortly be checked for its suitability for the journal and then forwarded for review.

You have been listed as author for the manuscript. If this is not the case, please reply to this email.

Sincerely,
EDT Editorial Office
Dental Traumatology, Editorial Office

Date Sent: 15-Oct-2020

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