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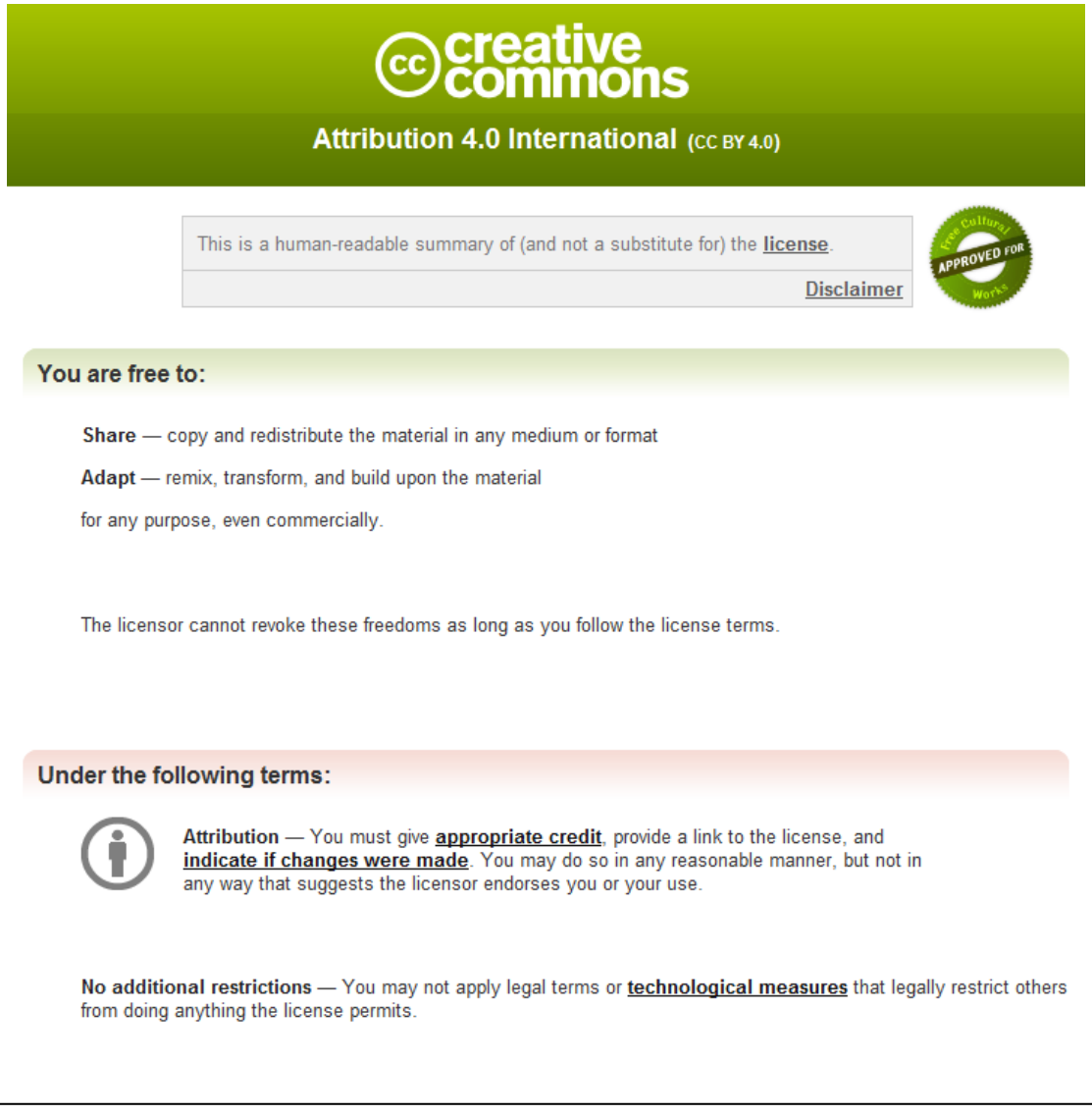

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REVIEW ARTICLE

Effect of breastfeeding on malocclusions: a systematic review and meta-analysis

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ABSTRACT

Aim: The objective of this systematic review was to investigate whether breastfeeding decreases the risk of malocclusions.

Methods: Six databases were systematically searched to the end of October 2014. Observational and interventional studies were included. Breastfeeding was evaluated in three categories: (i) ever *versus* never; (ii) exclusive *versus* absence of exclusive; and (iii) longer periods *versus* shorter periods. All types of malocclusion were considered as the outcome. Pooled adjusted odds ratio and its 95% confidence interval (95%CI) were obtained from meta-analyses. Heterogeneity was assessed with both the Q-test and the I-square. Funnel plots and Egger's test were employed to assess publication bias.

Results: Forty-eight studies were included in the systematic review, and 41 were included in the overall meta-analysis (n = 27 023 participants). Subjects who were ever breastfed were less likely to develop malocclusions than those never breastfed (OR 0.34; 95% CI 0.24; 0.48), those who were exclusively breastfed presented lower risk to present malocclusion than those with absence of exclusive breastfeeding (OR 0.54; 95% CI 0.38; 0.77), and subjects longer breastfed were less likely to have malocclusions than those shorter breastfed (OR 0.40; 95% CI 0.29; 0.54).

Conclusion: Breastfeeding decreases the risk of malocclusions.

INTRODUCTION

Among health conditions such as infectious diseases and childhood mortality, malocclusion has been considered a type of disorder which could be prevented by breastfeeding. Malocclusion is not a single disease, but a group of developmental disorders arising from multiple causes. These occur in the craniofacial structure, composed of jaw, tongue and facial muscles and may cause deformity or lack of functionality (1,2). Depending upon the extent of the disorder, malocclusion can impair quality of life (2), its treatment is expensive and it is not commonly covered by health insurance. The role of sucking habits on malocclusions, including breastfeeding, justifies special attention from researchers.

Biological plausibility of the relationship between breastfeeding and malocclusion

Some mechanisms have been proposed to explain the hypothetical protective effect of breastfeeding on malocclusion. The process of sucking differs between children who are breastfed and those who are fed from a bottle. Children who are breastfed present greater facial muscle activity than those who are bottle-fed, thus promoting more adequate craniofacial growth and development of jaw bones (3,4). The movement of lips and tongue during breastfeeding forces the child to draw breast milk through a squeeze action, while for children who are bottle-fed the movement for obtaining the milk is more passive; therefore, there is greater potential to develop a malocclusion (5). In addition, the nipple of the infant feeding bottle is usually made from a less flexible material, which can press the interior of the oral cavity and may cause inappropriate alignment of teeth and the transverse growth of the palate (6).

Abbreviations
ACB, Anterior cross-bite; AOB, Anterior open bite; CI, Confidence interval; MO, Malocclusion; Mo, Months; OR, Odds ratio; PCB, Posterior cross-bite; -yo, Years-old.

Key notes
- Malocclusions are more prevalent among children who are not breastfed;
- Exclusive breastfeeding has a beneficial impact on nonspecific malocclusions;
- Prolonged breastfeeding has a positive impact on preventing malocclusions, regardless of the type of occlusion disorder.

Another aspect of anatomy in favour of breastfeeding is that the mother's nipple adapts to the internal shape of the oral cavity, enabling a perfect oral seal which in turn leads to satisfactory development of nasal breathing. It is well acknowledged that children who have nasal breathing are less likely to develop open-mouth posture, which in turn may result in an excessive vertical facial dimension (7).

METHODS

The Joanna Briggs Institute (JBI) (8) guideline was followed for this systematic review.

Review questions

1 What is the effect size of breastfeeding compared to the absence of breastfeeding on malocclusions?
2 What is the effect size of exclusive breastfeeding compared to the absence of exclusive breastfeeding on malocclusions?
3 What is the effect size of longer duration of breastfeeding compared with shorter duration of breastfeeding on malocclusions?

Inclusion and exclusion criteria

We searched for observational and interventional studies which evaluated the association between breastfeeding and malocclusion.

The type of breastfeeding was evaluated in three distinct groups according to the review questions. All types of malocclusion were included as the outcome. No language or date restrictions were applied for this search.

Studies without an internal comparison between exposed and nonexposed groups were excluded. Additionally, reviews, technical reports, abstracts from conferences, case reports and series, and studies with explicit convenience sample were not considered.

Exposure: Categorisation of breastfeeding

The studies were classified according to the exposure categories detailed below (9):

1 *Ever breastfeeding versus never breastfeeding:* In this category, we pooled studies that compared subjects who were ever breastfed with subjects who were never breastfed.
2 *Exclusive breastfeeding versus absence of exclusive breastfeeding*: In this category, we combined all studies that provided information about exclusive breastfeeding independently of its duration compared with the absence of exclusive breastfeeding.
3 *Breastfeeding for long periods versus breastfeeding for short periods:* All studies that compared longer with shorter periods of breastfeeding were considered.

Outcomes: Categorisation of malocclusion

All types of malocclusion, such as nonspecific malocclusion, anterior open bite, posterior cross-bite, overbite, overjet, were combined and analysed as an outcome. As different types of malocclusion could present distinct aetiological factors, subgroup analyses were also performed to consider specific types of malocclusion as an outcome when feasible.

Search strategy

Electronic searches were conducted considering articles published up to the end of September 2014 on PubMed/Medline, Scopus, Web of Knowledge, Embase, SciELO and LILACS. Initially, the search was conducted on PubMed/Medline using the following strategy for the exposure (10): 'Breast Feeding'; 'Bottle Feeding'; 'Infant Formula'; 'Milk, Human'; 'Weaning'; 'Breastfeeding'; 'Predominant Breastfeeding'; 'Continuing Breastfeeding'; 'Continued Breastfeeding'; 'Breastfed'; 'Breastfeed'; 'Formula milk'; 'Formula feed'. For the outcome, the following terms were applied: 'Malocclusion'; 'Openbite'; 'Overbite'; 'Malocclusion, Angle Class III'; 'Malocclusion, Angle Class II'; 'Malocclusion, Angle Class I'; 'Overjet'; 'Cross-bite'; 'Canine relationship'; 'Molar relationship'; 'Deep bite'; 'Foster & Hamilton'; and 'Dental Aesthetic Index'.

After excluding the duplicates, titles and abstracts were screened to identify potentially relevant articles. In addition to the electronic search, reference lists of all included articles were examined. Full articles identified in the initial screening were assessed. These steps were performed independently by two reviewers and in cases of disagreement between reviewers, a third reviewer was consulted and a decision was made by consensus. Articles that were not found electronically were requested from the authors. Finally, all authors with two or more publications on this topic were considered experts, and an electronic message was sent to them asking for soon-to-be-published studies or unpublished reports.

Assessment of study characteristics and data extraction

Data were extracted using standardised protocol (8) with the following information: author, year of publication, setting (dichotomised in low-/middle-income countries and high-income countries), study design (cross-sectional, case–control and cohort studies), sample size (dichotomised in <300 subjects/300 or more subjects), outcomes and measurements, exposure, and the effect measure with respective 95% confidence interval. The language of publication (English language/language other than English) was also assessed.

Quality assessment

The Critical Appraisal Checklist recommended by JBI (8) was used for quality assessment. The checklist is composed of 10 items as indicated in Figure S1. Reviewers should answer with 'Yes', 'No' or 'Unclear' for each item. To classify studies by quality, an overall score for each study was calculated based on the number of 'Yes' answers. Thus, scores could range from 0 to 10. Finally, studies were categorised in tertiles according to the score obtained, as follows: 1st tertile (0–3): low quality; 2nd tertile (4–6):

medium quality; and 3rd tertile (7–10): high quality. Studies were assessed independently by two reviewers, and disagreements were resolved by consensus.

Data analysis

Effect size measure

Effect measures were presented as pooled odds ratios. In studies where the odds ratio was not available, the effect size was calculated or converted as necessary (11, 12, 13). Where adjusted results were available, they were included; otherwise, crude results estimates were considered. Authors were contacted to clarify any queries on the study methodology or result. Where there was no response from the authors, the article was excluded from the meta-analysis but considered in the qualitative assessment. When different categories of breastfeeding duration were present, the most extreme categories were considered for comparison in the meta-analysis.

Meta-analyses

Meta-analyses were conducted to consider all types of malocclusion as an outcome for the three specific exposures. The measure of association obtained from the overall malocclusions was used when available. When this measure was not provided, the greatest effect size from any specific malocclusion included in the study was considered in these meta-analyses. In addition, we performed separate meta-analyses considering specific malocclusions for which data were available. If a study presented data that could be used to respond to more than one review question, data were extracted and entered accordingly.

Fixed- and a random-effects models were applied to estimate the pooled effect of the studies. Heterogeneity was assessed with both the Q-test and the I-square; if either method suggested that between-studies variability was higher than that expected by chance ($p < 0.05$), the random model was used (14). As heterogeneity was present in all analyses, only random-effects models were employed in the meta-analyses. Funnel plot and Egger test were used to investigate publication bias (15). Meta-regression was used to evaluate the contribution of study characteristics to the between-study variability (15). Each covariate was separately included as a covariate in the meta-regression.

RESULTS

Electronic searches revealed 645 potential articles with 403 duplicates, leaving 242 to be included in the title and abstract evaluation. After screening, 171 articles were excluded. The remaining 71 studies received full-text reading. After contacting authors, one sent unpublished data. Figure 1 displays a flow chart of studies selection. Twenty-four articles were excluded after full-text reading or for not having the full-text available (Table S1).

Therefore, 48 studies fulfilled the criteria to be included in this review. Of these, only 41 presented data for at least one meta-analysis (Table S2). Thirteen studies were considered to be of high quality, 20 of medium quality and 15 of low quality.

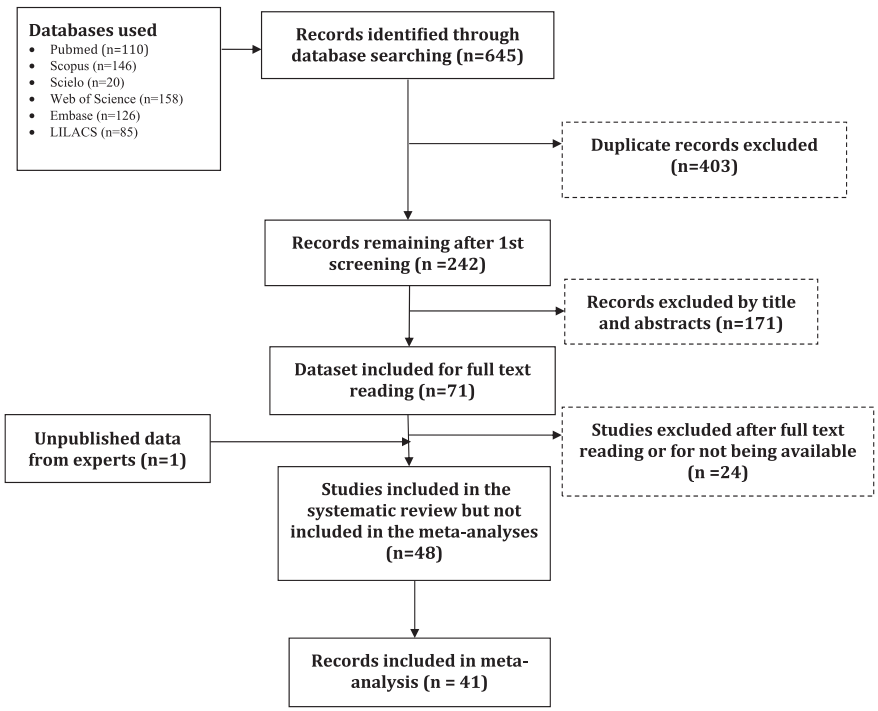

Figure 1 Flow chart of studies selection.

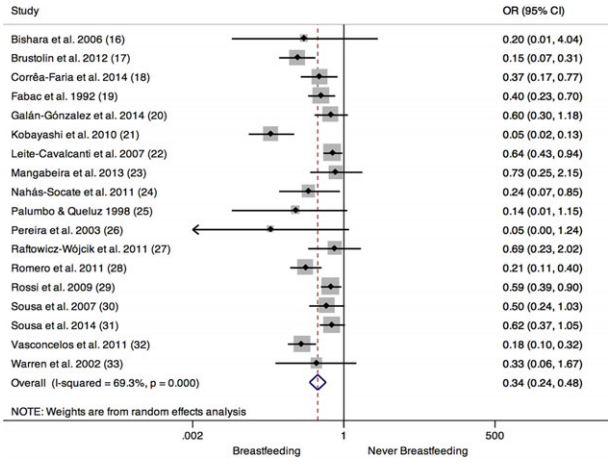

Figure 2 Pooled odds ratio and its 95% confidence interval of presenting nonspecific malocclusion, comparing ever breastfed versus never-breastfed subjects in different studies.

Ever breastfeeding versus never breastfeeding

This meta-analysis covered 18 articles and comprised 9143 participants (Table S3). Results revealed that participants ever exposed to any type of breastfeeding were less likely to develop malocclusions than those never breastfed [OR 0.34 (95%CI 0.24–0.48)] (Figure 2).

Figure S2 shows the funnel plot suggesting a predominance of small studies. Low-quality studies overestimated the effects of breastfeeding compared with high-quality studies (Table 1). Reports with a larger sample size, published in English and conducted in low- to middle-income countries also overestimated the association between any breastfeeding and low prevalence of malocclusion. Meta-regression analysis revealed that adjustment for type of malocclusion explained about 64% of heterogeneity.

Subjects who were breastfed were less likely to develop anterior open bite [OR 0.42 (95%CI 0.25–0.72)]. The quality of studies did not influence the effect size [low-quality studies: OR 0.44 (95%CI 0.21–0.92); high-quality studies: OR 0.47 (95%CI 0.23–0.93)]. The effects of breastfeeding on the occurrence of posterior cross-bite were not significant [OR 0.42 (95%CI 0.15–1.23)]. No differences were noted among studies with different quality rates [low-quality studies: OR 0.96 (95%CI 0.08–11.77); moderate-quality studies: OR 0.21 (95%CI 0.01–3.50); high-quality studies: OR 0.52 (95%CI 0.17–1.60)] (data not shown).

Exclusive breastfeeding versus absence of exclusive breastfeeding

This meta-analysis covered nine articles comprising 3897 subjects enrolled. Participants who were exclusively breastfed for a period of time were less likely to develop a malocclusion [OR 0.54 (95%CI 0.38–0.77)] compared to those who were not exclusively breastfed. Figure 3 displays the pooled analysis, indicating a protective effect of exclusive breastfeeding. Table S4 presents the main findings of included studies under this specific categorisation of breastfeeding.

Table 1 Subgroup analyses of studies comparing ever breastfeeding versus never breastfeeding according to methodological characteristic

Characteristic	Number of studies	Pooled odds ratio (95%CI)	p-value
Sample size			
<300	6	0.49 (0.34–0.71)	<0.001
≥300	12	0.30 (0.19–0.46)	<0.001
Setting			
Low- and middle-income countries	14	0.32 (0.21–0.48)	<0.001
High-income countries	4	0.45 (0.30–0.68)	<0.001
Language of publication			
English language	10	0.29 (0.17–0.49)	<0.001
Language other than English	8	0.43 (0.29–0.64)	<0.001
Quality			
Low	10	0.33 (0.22–0.49)	<0.001
Medium	5	0.25 (0.10–0.61)	0.024
High	3	0.56 (0.41–0.75)	<0.001
Type of malocclusion			
Non-specific	6	0.58 (0.45–0.75)	<0.001
Canine and molar relationship	4	0.43 (0.29–0.64)	<0.001
Anterior Open Bite	5	0.28 (0.16–0.51)	<0.001
Cross Bite	2	0.06 (0.02–0.14)	<0.001
Overjet	1	0.14 (0.01–1.50)	0.141
Overall	18	0.34 (0.24–0.48)	<0.001

Note: Meta-analysis was not stratified by adjustment for confounders due to the absence of adjusted studies.

Figure S3 suggests a predominance of small studies. The effect of exclusive breastfeeding on malocclusion was statistically significant only among studies that presented a sample size greater than 300 subjects, those published in the English language and those evaluated as low-/middle-quality studies (Table 2). Studies developed in low- and middle-income countries overestimated the impact of breastfeeding compared with those in high-income countries. The small number of studies also precluded the meta-regression analysis.

When looking at the effects of exclusive breastfeeding on anterior open bite, the pooled estimate demonstrated no effects [OR 0.80 (95%CI 0.55–1.14)], without differences between high quality [OR 0.80 (95%CI 0.32–1.94)] and low-/moderate-quality studies [OR 0.80 (95%CI 0.61–1.06)]. With regard to the effects of exclusive breastfeeding on posterior cross-bite, a borderline negative association was observed in the pooled effect [OR 0.61 (95%CI 0.37–1.00)]. No difference between high quality of studies [OR 0.60(95%CI 0.34–1.07)] and low-/moderate-quality studies [OR 0.76 (95%CI 0.26–2.21)] was found (data not shown).

Breastfeeding for long periods versus breastfeeding for short periods

Thirty-two studies were included in this meta-analysis, comprising 23 450 participants (Table S5). A combined estimate demonstrates that individuals who were breastfed for longer periods were 60% less likely to develop maloc-

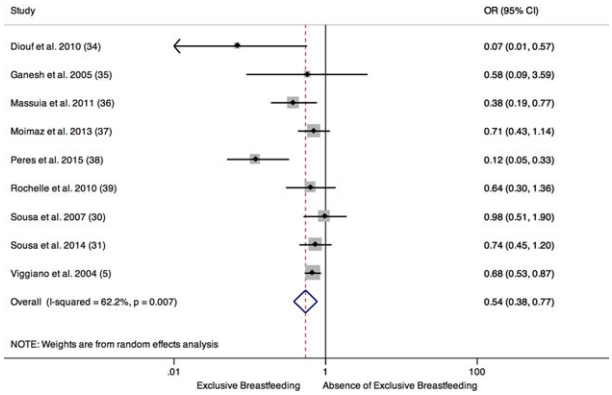

Figure 3 Pooled odds ratio and its 95% confidence interval of presenting nonspecific malocclusion, comparing exclusive breastfed versus not-exclusive breastfed subjects in different studies.

Table 2 Subgroup analyses of studies comparing exclusive breastfeeding versus absence of exclusive breastfeeding according to methodological characteristic

Characteristic	Number of studies	Pooled odds ratio (95%CI)	p-value
Sample size			
<300	3	0.37 (0.11–1.26)	0.112
≥300	6	0.57 (0.38–0.84)	0.004
Setting			
Low- and middle-income countries	8	0.49 (0.31–0.79)	0.003
High-income countries	1	0.68 (0.53–0.87)	0.002
Language of publication			
English language	6	0.45 (0.26–0.78)	0.005
Language other than English	3	0.66 (0.42–1.07)	0.093
Quality			
Low/Medium*	6	0.62 (0.44–0.88)	0.007
High	3	0.41 (0.15–1.11)	0.082
Overall	9	0.54 (0.38–0.77)	0.001

*As only one study presented low quality, it was included in the same category as moderate-quality studies.
Note: Subgroups meta-analysis was not performed by type of malocclusion and adjustment for confounder due to insufficient number of studies.

clusions compared to those who were breastfed for shorter periods [OR 0.40(95%CI 0.29–0.54)]. Figure 4 shows the pooled result.

The funnel plot indicates a clear publication bias (Figure S4). Additionally, the Egger's test indicated a small-study effect (p = 0.015). Studies conducted in high-income countries and those published in English demonstrated less or no protective effect from prolonged breastfeeding on malocclusion development compared to low income and non-English studies (Table 3). Studies with adjusted estimates presented a greater protective effect from prolonged breastfeeding than nonadjusted studies. Meta-regression analysis showed that the setting where the study was conducted and the language of publication accounted for 11% and 12%, respectively, of the overall heterogeneity.

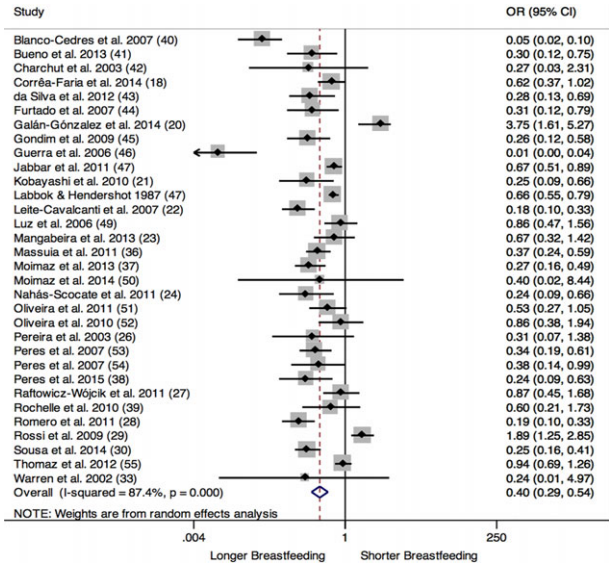

Figure 4 Pooled odds ratio and its 95% confidence interval of presenting nonspecific malocclusion, comparing longer breastfed versus shorter breastfed subjects in different studies.

Table 3 Subgroup analyses of studies comparing longer duration of breastfeeding versus shorter duration of breastfeeding according to methodological characteristic

Characteristic	Number of studies	Pooled odds ratio (95%CI)	p-value
Sample size			
<300	16	0.37 (0.19–0.71)	0.003
≥300	16	0.42 (0.30–0.58)	<0.001
Setting			
Low- and middle-income countries	28	0.36 (0.25–0.50)	<0.001
High-income countries	4	0.89 (0.23–3.37)	0.860
Language of publication			
English language	20	0.54 (0.40–0.72)	<0.001
Language other than English	12	0.25 (0.12–0.50)	<0.001
Quality			
Low	6	0.41 (0.21–0.81)	0.001
Medium	15	0.36 (0.21–0.61)	<0.001
High	11	0.43 (0.27–0.68)	<0.001
Adjustment			
Yes	4	0.31 (0.21–0.46)	<0.001
No	28	0.41 (0.29–0.57)	<0.001
Type of malocclusion			
Non-specific	11	0.49 (0.32–0.74)	0.001
Canine and molar relationship	7	0.29 (0.09–0.92)	0.036
Anterior Open Bite	4	0.25 (0.19–0.34)	<0.001
Cross Bite	4	0.49 (0.30–0.79)	0.004
Overjet	3	0.66 (0.50–0.86)	0.002
Overbite	3	0.30 (0.13–0.68)	0.004
Overall	32	0.40 (0.29–0.54)	<0.001

Considering the effect of prolonged breastfeeding on anterior open bite establishment, a consistent protective effect was observed among the 14 studies [OR 0.31 (95%CI

0.20–0.48)]. However, a significant protective effect was found only among high-quality studies [low-quality studies: OR 1.08 (95%CI 0.02–55.5); moderate-quality studies: OR 0.35 (95%CI 0.09–1.40); high-quality studies: OR 0.28 (95% CI 0.21–0.36)]. Similar results were observed when the evaluated outcome was posterior cross-bite. The overall analysis of 10 studies demonstrated a protective effect from longer duration of breastfeeding on this particular malocclusion [OR 0.59 (95%CI 0.39–0.87)]. Once again, this effect was only observed among high-quality studies [low-quality studies: OR 2.10 (95%CI 0.26–16.9); moderate-quality studies: OR 0.66 (95%CI 0.32–1.39); high-quality studies: OR 0.49 (95%CI 0.31–0.77)]. Finally, subjects with longer exposure to breastfeeding were less likely to develop overjet than those with shorter exposure [OR 0.49 (95%CI 0.28–0.87)]. The quality of the study also influenced the results. The protective effect was present only among high-quality studies [moderate-quality studies: OR 0.62 (95%CI 0.21–1.79); high-quality studies: OR 0.44 (95%CI 0.23–0.88)].

All Breastfeeding Categories

In this analysis, we pooled results from all 41 articles included in this series of meta-analyses enrolling 27 023 individuals. The overall results revealed that individuals who were breastfed were 70% less likely to develop a malocclusion compared to those who were not breastfed or were breastfed for shorter periods [OR 0.32 (95%CI 0.25–0.40)]. Additionally, similar results were observed when specific types of malocclusion were investigated (Table 4).

A small-study effect was noted in this analysis (Egger's test $p < 0.001$). In the meta-regression model, language of publication explained about 17% of all heterogeneity. Finally, when considering only high-quality studies, results also corroborated the protective effect of breastfeeding on the occurrence of a malocclusion, regardless of the type (Table 4).

CONCLUSION AND RECOMMENDATIONS

The finding of this series of meta-analyses is that breastfeeding could be considered a protective factor against malocclusions. A relevant difference in the magnitude of this association was noted when high-quality studies were compared with the overall analysis. It is possible to presume that low- and middle-quality studies overestimated the effects of breastfeeding, influencing the combined results. In addition, the lack of information on whether children were fed with breast milk at the breast or in a bottle may be considered as a potential confounder. Also, the fact that the greatest association was selected from each study may have resulted in a large overall effect. However, all associations of the same study did not vary greatly. Results from this specific meta-analysis also showed that breastfeeding played an important role in the prevention of anterior open bite, regardless of the quality of the studies. These beneficial effects however were not observed on posterior cross-bite.

Exclusive breastfeeding also has a beneficial impact on nonspecific malocclusions. However, this effect was not observed when anterior open bite and posterior cross-bite were analysed separately. Exclusive breastfeeding might have an impact on other malocclusions, supporting the need for more studies exploring types of malocclusion other than anterior open bite and posterior cross-bite. Even though a protective effect of exclusive breastfeeding was demonstrated, it is worth pointing out that only nine studies were included in this category, suggesting that more studies dealing with this type of breastfeeding should be conducted.

Finally, with regard to the duration of breastfeeding, our results revealed that longer duration of breastfeeding is a protective factor against nonspecific malocclusion, as well as for anterior open bite and posterior cross-bite, regardless of the quality of studies. These results support the idea that prolonged breastfeeding has a positive impact on preventing malocclusions, regardless of type.

The general benefits of breastfeeding for children's health and the combined effects of breastfeeding indicating a protective effect for malocclusions, support the current recommendation for breastfeeding being maintained. Emphasis should be given to conducting prospective well-designed studies to investigate the relationship between breastfeeding and specific types of malocclusion with appropriate statistical approach, and controlling for potential confounders. This approach would provide stronger evidence for dental professionals and policy makers. Our results reinforce the common risk approach as the promo-

Table 4 Overall and high-quality studies pooled results according to different exposures and outcomes

	Malocclusions					
	Overall (OR and 95%CI)			High-quality studies (OR and 95%CI)		
	Non-specific MO	AOB	PCB	Nonspecific MO	AOB	PCB
Ever breastfeeding	0.34 (0.24–0.48)	0.42 (0.25–0.72)	0.42 (0.15–1.23)	0.56 (0.41–0.75)	0.47 (0.23–0.93)	0.52 (0.17–1.60)
Exclusive breastfeeding	0.54 (0.38–0.77)	0.80 (0.55–1.14)	0.61 (0.37–1.00)	0.41 (0.15–1.11)	0.80 (0.32–1.94)	0.60 (0.34–1.07)
Longer duration of breastfeeding	0.40 (0.29–0.54)	0.31 (0.20–0.48)	0.59 (0.39–0.87)	0.43 (0.29–0.58)	0.28 (0.21–0.36)	0.49 (0.31–0.77)
All breastfeeding categories	0.32 (0.25–0.40)	0.37 (0.32–0.44)	0.47 (0.29–0.75)	0.34 (0.22–0.53)	0.28 (0.21–0.36)	0.34 (0.23–0.50)

AOB = Anterior open bite; MO = Malocclusions; PCB = Posterior cross-bite; OR = Odds ratio; CI = Confidence interval.

tion of breastfeeding is a common strategy to protect against other diseases such as obesity, and high systolic blood pressure (10).

CONFLICT OF INTEREST AND FUNDING STATEMENT

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AUTHOR STATEMENT

KGP contributed to the project's conception, statistical analysis, writing, relevant critical revision of the intellectual content and final approval of the manuscript. AMC contributed to the literature search, data extraction, critical appraisal, revision and final approval of the manuscript. GGN contributed to the literature search, data extraction, critical appraisal, statistical analysis, writing and final approval of the manuscript. CGV proposed the project, contributed to the definition of intellectual content, critical appraisal and the final approval of the manuscript.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Data S1. Search Strategy according to the different databases.
Figure S1. Quality assessment items – Joanna Briggs Institute Reviewers' manual: 2014 edition.
Figure S2. Funnel plot showing Odds Ratio for malocclusion among those subjects who were ever breastfed (standard error -SE of Odds Ratio).
Figure S3. Funnel plot showing Odds Ratio for malocclusion among those subjects who were exclusively breastfed (standard error -SE of Odds Ratio).
Figure S4. Funnel plot evidencing Odds Ratio for malocclusion among those subjects who had prolonged breastfeeding (standard error -SE of Odds Ratio).
Table S1. Excluded articles and main reason for exclusion.
Table S2. Main findings of studies included in the systematic review but not included in the meta-analysis.
Table S3. Main findings of studies that fulfilled inclusion criteria comparing ever breastfeeding with never breastfeeding.
Table S4. Main findings of studies that fulfilled the including criteria comparing exclusive breastfeeding with absence of exclusive breastfeeding.
Table S5. Main findings of studies that fulfilled inclusion criteria comparing longer duration of breastfeeding with shorter duration of breastfeeding.