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Review Article

Risk of Preterm Birth and Low Birth Weight in Relation to Periodontal Disease Among Pregnant Women: An Umbrella Review

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ABSTRACT

This umbrella review investigates whether periodontal disease in expectant mothers is linked to an increased likelihood of preterm birth and infants with low birth weight. A thorough search of biomedical literature was performed up to November 2021 using PubMed/Medline, Cochrane Library, Scopus, EMBASE, Web of Science, Scielo, LILACS, and Google Scholar. Included studies were systematic reviews in English, with no restriction on publication date, that examined the relationship between maternal periodontal health and adverse birth outcomes. The methodological rigor of the studies was evaluated using AMSTAR-2, and the certainty of evidence along with recommendation strength was assessed through GRADEPro GDT. From 161 initially identified articles, 15 met the inclusion criteria, and seven were suitable for meta-analysis. Findings indicate a notable association between periodontal disease during pregnancy and elevated risks of both preterm delivery and low birth weight in newborns. Maternal periodontal disease appears to be associated with higher chances of preterm birth and low birth weight, highlighting the importance of oral health management during pregnancy.

Keywords: Review, Periodontal disease, Low birth weight, Preterm birth, Pregnant women, Pregnancy

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Introduction

Periodontal disease (PD) is a bacterial infection that targets the supporting structures of teeth, triggering inflammatory responses and progressive destruction of the periodontium, which can ultimately result in tooth loss [1, 2]. The onset and progression of PD arise from a complex interplay between disrupted oral microbiota and the host's immune susceptibility [3, 4]. Gingivitis represents the initial stage, typically caused by the accumulation of dental plaque due to inadequate oral hygiene. Clinically, it manifests as localized gum inflammation, often accompanied by redness and bleeding. Without timely intervention, gingivitis can advance to chronic periodontitis [5].

As the bacterial infection progresses, severe periodontium destruction occurs, leading to tooth loss and negatively affecting mastication, appearance, self-esteem, and overall quality of life [6]. Additionally, PD contributes to systemic inflammation, as bacterial components and inflammatory mediators can trigger or exacerbate systemic diseases [2, 7]. Global PD prevalence is estimated to range from 20% to 50% [8], and growing evidence links it to cardiovascular diseases, diabetes mellitus, chronic obstructive pulmonary disease, rheumatoid arthritis, and adverse pregnancy outcomes [9].

Among pregnant women, PD affects approximately 40% [10]. Hormonal changes during pregnancy, particularly elevated estrogen and progesterone levels, increase susceptibility to gingivitis, with 50–70% of expectant mothers affected, making them more prone to PD than nonpregnant women [11].

Preterm birth (PB) is a significant public health concern, with roughly 15 million premature infants

born globally each year, many weighing under 2500 g [12]. PB and low birth weight (LBW) are major contributors to neonatal morbidity and mortality. Factors influencing these outcomes include multiparity, low socioeconomic status, maternal age, ethnicity, history of preterm delivery, infections, and substance abuse [13, 14]. Although the majority of PB cases occur in Africa and South Asia, preterm birth is a worldwide issue [15].

Despite advances in obstetric care, PB remains a persistent challenge in both developed and developing nations, with rates showing little decline over the past decade [16–18]. Several studies have suggested a link between maternal PD and increased risk of PB and/or LBW [19–25]. Two main mechanisms have been proposed to explain this association: first, periodontopathogenic bacteria present in gingival plaque may reach the fetus via bacteremia [15, 26]; second, inflammatory mediators produced locally in the subgingival environment (e.g., IL-1, IL-6, IL-8, TNF-alpha, prostaglandin E2) may enter the fetoplacental circulation, inducing inflammatory responses [27].

Women with PD have a significantly higher likelihood of delivering PB or LBW infants compared to those with healthy periodontal tissues, with some reports suggesting up to a sevenfold increased risk [22, 28]. Consequently, early identification of PD in pregnant women is critical for implementing preventive and therapeutic strategies aimed at reducing PB and LBW incidence [29, 30].

Given the public health significance of this topic, synthesizing results from systematic reviews and meta-analyses can provide more robust and consistent evidence. The primary objective of this review is to critically evaluate existing literature on the relationship between maternal PD and the risk of PB and LBW.

Materials and Methods

Protocol and registration

This systematic review followed a predefined protocol in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [31]. The protocol is registered with PROSPERO under CRD42021290027.

The review was structured around a focused research question based on the PICO framework:

- Population: Pregnant women at risk of PB and LBW
- Intervention: Pregnant women with PD
- Comparison: Pregnant women without PD
- Outcomes: Association between PD and PB (<37 weeks) and LBW (<2500 g)

Focused question (PICO)

Does periodontal disease in pregnant women increase the risk of preterm birth and low birth weight?

Search and selection of studies

A systematic search was conducted up to November 2021 across eight electronic databases: PubMed/Medline, Cochrane Library, Scopus, EMBASE, Web of Science, Scielo, LILACS, and Google Scholar. Keywords and subject headings were tailored to each database, including terms such as “periodontal disease,” “periodontitis,” “gingivitis,” “preterm birth,” “low birth weight,” “perinatal outcomes,” “premature labor,” and “adverse pregnancy outcomes.” Detailed search strategies for each database are summarized in **Table 1.**

Table 1. Search strategies for each database.

Database	Search Strategy
PubMed/Medline	((((“periodontal disease treatment”) OR periodontitis) OR gingivitis) AND (((((“preterm birth”) OR “low birth weight”) OR “perinatal outcomes”) OR “premature labor”) OR “adverse pregnancy outcomes”)
Cochrane Library	#1 MeSH descriptor: [Periodontal Diseases] explode all trees #2 MeSH descriptor: [Periodontitis] explode all trees #3 MeSH descriptor: [Gingivitis] explode all trees #4 (periodontal disease treatment) OR (periodontitis) OR (gingivitis) (Word variations have been searched) #5 #1 OR #2 OR #3 OR #4 #6 MeSH descriptor: [Premature Birth] explode all trees #7 MeSH descriptor: [Infant, Low Birth Weight] explode all trees #8 MeSH descriptor: [Obstetric Labor, Premature] explode all trees #9 (preterm birth) OR (low birth weight) OR (perinatal outcomes) OR (premature labor) OR (adverse pregnancy outcomes) (Word variations have been searched)

	#10 #6 OR #7 OR #8 OR #9 #11 #5 AND #10
Scopus	TITLE-ABS-KEY (((“periodontal disease treatment”) OR periodontitis) OR gingivitis) AND TITLE-ABS-KEY (((((“preterm birth”) OR “low birth weight”) OR “perinatal outcomes”) OR “premature labor”) OR “adverse pregnancy outcomes”) AND TITLE-ABS-KEY (“systematic review”) AND (LIMIT-TO (SUBJAREA, “DENT”)) AND (LIMIT-TO (DOCTYPE, “re”))
Scielo	((((“periodontal disease”) OR (treatment) (periodontitis) OR (gingivitis))) AND (((“preterm birth”) OR (“low birth weight”) OR (“perinatal outcomes”) OR (“premature labor”) OR (“adverse pregnancy outcomes”))))) AND ((“systematic review”)) ((((“enfermedad periodontal”) OR (tratamiento) OR (periodontitis) OR (gingivitis))) AND (((“parto pretérmino”) OR (“bajo peso al nacer”) OR (“resultados perinatales”) OR (“resultados adversos al embarazo”)))) AND ((“revisión sistemática”))
EMBASE	(‘periodontal disease treatment’:ti,ab,kw OR periodontitis:ti,ab,kw OR gingivitis:ti,ab,kw) AND (‘preterm birth’:ti,ab,kw OR ‘low birth weight’:ti,ab,kw OR ‘perinatal outcomes’:ti,ab,kw OR ‘premature labor’:ti,ab,kw OR ‘adverse pregnancy outcomes’:ti,ab,kw) AND ‘systematic review’:ti,ab,kw
Web of Science	((TS = (((“periodontal disease treatment”) OR (periodontitis) OR (gingivitis)))) AND TS = (((“preterm birth”) OR (“low birth weight”) OR (“perinatal outcomes”) OR (“premature labor”) OR (“adverse pregnancy outcomes”)))) AND TS = ((“systematic review”))
Google Scholar	allintitle: “periodontal disease treatment” “preterm birth” “systematic review” allintitle: “periodontitis” “preterm birth” “systematic review” allintitle: “periodontitis” “low birth weight” “systematic review”

The literature search was conducted independently across all databases by four authors (H.A., T.P., L.C., and F.C.). For an article to be included in this review, it had to be a systematic review, with or without meta-analysis, published in English, with no restriction on publication date, and addressing the relationship between maternal periodontal disease (PD) and the risk of preterm birth (PB) or low birth weight (LBW). Prospective studies and unpublished data were excluded from consideration.

Data extraction

Data from eligible studies were collected using a predefined extraction template that captured details such as author(s), year of publication, study type, types of studies included, number of studies in qualitative and quantitative analyses, type of periodontal disease assessed, main findings, effect measures (OR/RR), and conclusions. Three investigators (V.M., S.C., and E.M.) performed the extraction independently, with any discrepancies resolved through consultation with a fourth reviewer.

Risk of bias (RoB) assessment

Two calibrated authors (V.M. and T.P.) independently assessed the methodological quality of the included studies using the AMSTAR-2 tool, a validated instrument for evaluating systematic reviews in health research (kappa = 0.98) [32]. Any disagreements were discussed with a fourth reviewer (H.V.) to reach consensus. AMSTAR-2 evaluates systematic reviews across 16 domains with response options: “yes” for adherence, “no” for non-adherence or insufficient information, and “partial” when criteria are only partly met. Studies are then categorized into four confidence levels: high, moderate, low, or critically low.

Data analysis

The extracted data were analyzed using RevMan 5.3 (Cochrane Collaboration, London, UK), calculating odds ratios (OR) under a fixed-effects model with 95% confidence intervals. Additionally, the certainty of evidence and strength of recommendations were assessed using the GRADE approach with the GRADEPro GDT tool (McMaster University and Evidence Prime Inc., Canada).

Results and Discussion

Study selection

A combination of electronic and manual searches identified 161 articles, of which 69 were duplicates **(Figure 1)**. After screening titles and abstracts, 20 full-text articles were reviewed. Following further assessment, five studies were excluded, leaving 15 systematic reviews eligible for qualitative synthesis, with seven included in the quantitative meta-analysis. Details regarding the reasons for exclusion are provided in **Table 2**.

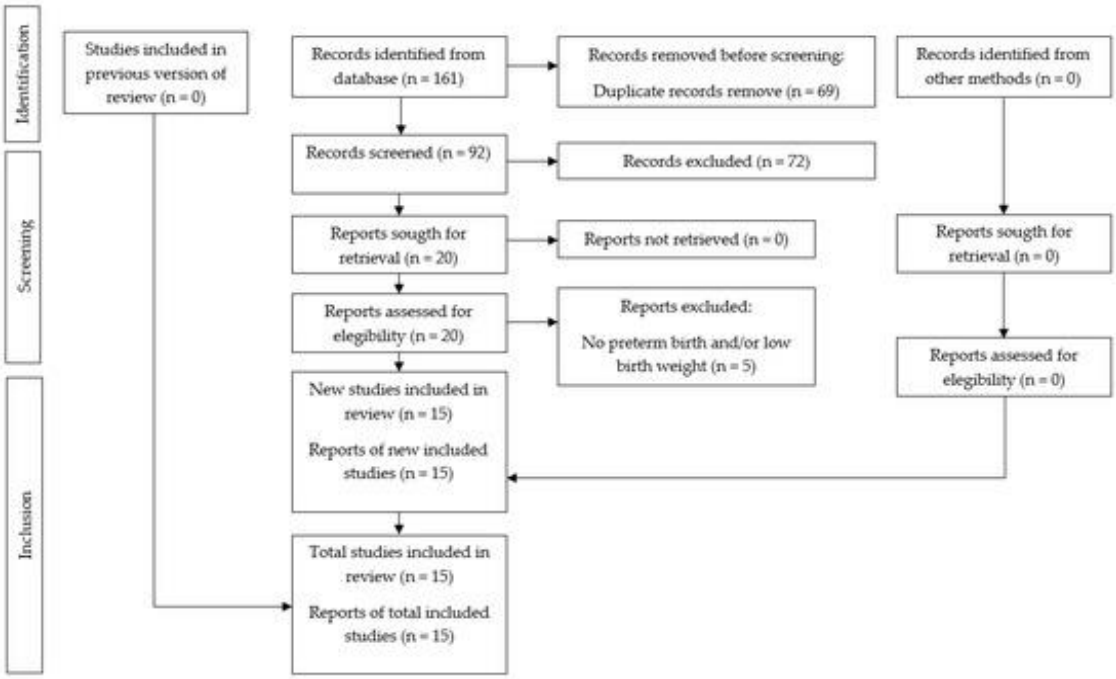

Figure 1. PRISMA flowchart showing the process of inclusion and exclusion of studies in the systematic review.

Table 2. Reason for exclusion of included studies.

Authors	Reason for Exclusion
Bashir *et al*. [33], Gharehghani *et al*. [34], Konopka *et al*. [35], Abariga *et al*. [36], Kunnen *et al*. [37]	Studies not referring to PB or LBW

Characteristics of the included studies

A total of fifteen systematic reviews were included in this umbrella review [19-25, 38-45], with nine of them [19, 20, 23, 38-45] incorporating meta-analyses. The studies were conducted in various countries, including Brazil [25, 38], Spain [19], Colombia [20], Indonesia [21], Ethiopia [22], Italy [23, 39, 45], the United Kingdom [40], the United States [24, 41], and Jordan [42] **(Table 3)**.

Table 3. Characteristics of the Included Studies

Author(s)	Year	Study Design	Country	Included Study Types	Studies in Qualitative Analysis	Studies in Quantitative Analysis	Periodontal Condition	Outcomes Assessed	OR/RR (95% CI)	Key Findings
Porto *et al*. [38]	2021	Systematic Review with Meta-Analysis	Brazil	Case-control, cohort	21	21	Periodontitis	Low Birth Weight (LBW)	OR: 2.64 (2.04–3.42) / RR: NR	Periodontitis in pregnant women is associated with over twice the likelihood of delivering babies with low birth weight.
Moliner-Sánchez *et al*. [19]	2020	Systematic Review with Meta-Analysis	Spain	Cohort	11	11 (11 PB, 6 LBW)	Periodontal Disease	Preterm Birth (PB), LBW	OR: NR / RR: PB = 1.67 (1.17–2.38), LBW	Periodontal disease is linked to both preterm

								= 2.54 (1.61–3.98)	birth and low birth weight.
Manrique-Corredor *et al*. [20]	2019	Systematic Review with Meta-Analysis	Colombia	Case-control, cohort	31	20	Periodontitis	Preterm Birth (PB)	OR: 2.01 (1.71–2.36) / RR: NR	Periodontitis is associated with an increased risk of preterm birth.
Syafar *et al*. [21]	2019	Systematic Review	Indonesia	Case-control	6	0	Periodontal Disease	Low Birth Weight (LBW)	OR: NR / RR: NR	A connection exists between periodontal disease and preterm birth.
Teshome *et al*. [22]	2016	Systematic Review	Ethiopia	Case-control	10	0	Periodontal Disease	Low Birth Weight (LBW)	OR: NR / RR: NR	Periodontitis is associated with preterm birth.
Corbella *et al*. [39]	2016	Systematic Review with Meta-Analysis	Italy	Case-control	22	22 (14 PB, 10 LBW)	Periodontitis	PB, LBW, PB + LBW	OR: NR / RR: PB = 1.61 (1.33–1.95), LBW = 1.65 (1.27–2.14), PB + LBW = 3.44 (1.34–8.8)	Periodontitis is linked to preterm birth, low birth weight, and their combination.
Ide *et al*. [40]	2013	Systematic Review with Meta-Analysis	United Kingdom	Case-control, cohort, cross-sectional	18	16 (14 PB, 2 LBW)	Periodontitis	PB, PB + LBW	OR: PB = 2.47 (2.19–2.77), PB + LBW = 2.06 (1.34–3.16) / RR: PB = 1.15 (0.89–1.49)	Periodontitis is associated with preterm birth and combined preterm birth and low birth weight.
Corbella *et al*. [23]	2012	Systematic Review with Meta-Analysis	Italy	Case-control	17	17 (14 PB, 7 LBW)	Periodontal Disease	PB, LBW, PB + LBW	OR: PB = 1.78 (1.58–2.01), LBW = 1.82 (1.51–2.2), PB + LBW = 3.00 (1.93–4.68) / RR: NR	Periodontal disease is associated with preterm birth, low birth weight, and their combination.
Corbella *et al*. [45]	2012	Systematic Review with Meta-Analysis	Italy	Case-control, cohort, clinical trials	37	5 (5 PB, 5 LBW)	Periodontal Disease	PB, LBW	OR: NR / RR: NR	Evidence is inconclusive on periodontal disease as a major risk factor for adverse pregnancy outcomes, though a minor effect may exist.
Xiong *et al*. [41]	2007	Systematic Review with Meta-Analysis	United States	Case-control, cohort, clinical trials	26 (12 PB, 10 LBW)	4 (3 PB, 2 LBW)	Periodontal Disease	PB, LBW	OR: NR / RR: NR	Periodontal disease is linked to preterm birth and low birth weight.
Vettore *et al*. [25]	2006	Systematic Review	Brazil	Case-control, cohort, clinical trials	36 (30 PB, 28 LBW)	0	Periodontal Disease	PB, LBW	OR: NR / RR: NR	The association between periodontal disease and preterm birth or low birth weight

										could not be confirmed.
Xiong *et al*. [24]	2006	Systematic Review	United States	Case-control, cohort, clinical trials	25 (8 PB, 6 LBW)	0	Periodontal Disease	PB, LBW	OR: NR / RR: NR	Periodontal disease is associated with preterm birth and low birth weight.
Khader *et al*. [42]	2005	Systematic Review with Meta-Analysis	Jordan	Case-control, cohort	5	4 (3 PB, 2 LBW)	Periodontal Disease	PB, LBW, PB + LBW	OR: PB = 4.32 (2.5–7.44), LBW = 5.28 (2.21–12.62), PB + LBW = 5.28 (2.21–12.62) / RR: NR	Periodontal disease is associated with preterm birth, low birth weight, and their combination.
Scannapieco *et al*. [43]	2003	Systematic Review	United States	Case-control, cohort, cross-sectional, clinical trials	12	0	Periodontal Disease	PB, LBW	OR: NR / RR: NR	Periodontal disease is linked to preterm birth and low birth weight.
Madianos *et al*. [44]	2002	Systematic Review	United States	Case-control, cohort, cross-sectional, clinical trials	25 (5 LBW)	0	Periodontitis	PB	OR: NR / RR: NR	The link between periodontitis and preterm birth could not be established.

Abbreviations: NR: Not Reported, SR: Systematic Review, MA: Meta-Analysis, PD: Periodontal Disease, PB: Preterm Birth, LBW: Low Birth Weight, OR: Odds Ratio, RR: Relative Risk, CI: Confidence Interval.

All of the systematic reviews analyzed [19-25, 38-45] included diverse study designs, such as cohort studies, case–control studies, cross-sectional studies, and clinical trials. The number of studies incorporated for qualitative synthesis ranged from 5 to 36, while quantitative synthesis included 4 to 22 studies. Every review assessed periodontal disease (PD), but the primary outcomes varied: four studies [21, 22, 38, 44] focused on low birth weight (LBW), one study [20] on preterm birth (PB) alone, six studies [19, 24, 25, 41, 43, 45] considered both PB and LBW, one study [40] addressed PB as well as PB with LBW, and three studies [23, 39, 42] evaluated all three outcomes—PB, LBW, and PB combined with LBW **(Table 3)**.

Among the nine reviews that conducted meta-analyses [19, 20, 23, 38-42, 45], two [41, 45] limited their analyses to clinical trials only. Five studies [20, 23, 38, 40, 42] used odds ratios (OR) to estimate associations, while three studies [19, 39, 40] relied on relative risk (RR). Notably, three reviews [25, 44, 45] concluded that the current evidence was insufficient to definitively link PD with PB or LBW **(Table 3)**.

Risk of bias assessment

The methodological quality of the included reviews varied: eight studies [19, 20, 22, 23, 38- 41] were rated as high confidence, five [21, 24, 25, 43, 44] as moderate, and two [42, 45] as low confidence **(Table 4)**.

Table 4. Risk of bias in the analysis of the included studies.

Author	**Year**	**AMSTAR-2**																**Overall Confidence**
		1	**2 ***	**3**	**4 ***	**5**	**6**	**7 ***	**8**	**9 ***	**10**	**11 ***	**12**	**13 ***	**14**	**15 ***	**16**	
Porto *et al.* [38]	2021	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High

Moliner-Sánchez *et al*. [19]	2020	Yes	Yes	Yes	Yes	Yes	No	Yes partial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Manrique-Corredor *et al*. [20]	2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Syafar *et al*. [21]	2019	Yes	Yes	No	Yes	Yes	Yes	Yes partial	Yes	Yes	No	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	Yes	Moderate
Teshome et al. [22]	2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	No	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	Yes	High
Corbella *et al*. [39]	2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Ide *et al*. [40]	2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Corbella *et al*. [23]	2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Corbella *et al*. [45]	2012	Yes	Yes partial	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Low
Xiong *et al*. [41]	2007	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Vettore *et al*. [25]	2006	Yes	Yes partial	Yes	Yes	No	No	Yes partial	Yes	Yes	Yes	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	Yes	Moderate
Xiong *et al*. [24]	2006	Yes	Yes	Yes	Yes	No	No	Yes partial	Yes	Yes	No	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	No	Moderate
Khader *et al*. [42]	2005	Yes	Yes partial	Yes	No	Yes	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Low
Scannapieco *et al*. [43]	2003	Yes	Yes	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	No	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	No	Moderate
Madianos *et al*. [44]	2002	Yes	Yes partial	Yes	Yes	Yes	Yes	Yes partial	Yes	Yes	No	No meta-analysis	No meta-analysis	Yes	Yes	No meta-analysis	No	Moderate

AMSTAR (A Measurement Tool to Assess Systematic Reviews) is an instrument designed to evaluate the methodological quality of systematic reviews. The AMSTAR-2 checklist includes the following 16 items:

1. Are the research questions and inclusion criteria structured to incorporate PICO components?
2. Does the review clearly state that the methods were determined prior to conducting the review and explain any significant deviations from the protocol?
3. Did the authors specify which study designs were eligible for inclusion?
4. Was a thorough and comprehensive literature search strategy implemented?
5. Were study selection processes carried out independently by more than one reviewer?
6. Was data extraction performed independently by multiple reviewers?
7. Did the authors provide a justified list of excluded studies?
8. Were the included studies described in adequate detail?
9. Did the authors employ an appropriate method to assess the risk of bias for individual studies?
10. Were the funding sources of the included studies reported?
11. If a meta-analysis was conducted, were proper statistical methods used to combine results?
12. For meta-analyses, did the authors evaluate how risk of bias in individual studies could influence the combined results or other evidence synthesis?
13. Did the review consider the risk of bias in individual studies when interpreting and discussing findings?
14. Did the authors offer a clear explanation for any observed heterogeneity and discuss its implications?
15. When quantitative synthesis was performed, did the reviewers appropriately examine publication bias (e.g., small study effects) and its potential influence on the results?
16. Were potential conflicts of interest disclosed, including funding received for conducting the review?

Items marked with an asterisk (*) are considered critical domains in the assessment.

Synthesis of Results

Seven studies [19, 20, 23, 38-40, 42] examined the relationship between maternal periodontal disease (PD) and the risk of preterm birth (PB) and low birth weight (LBW) in newborns. The findings consistently indicated that PD in pregnant women is linked to an increased likelihood of PB, LBW, as well as the combined outcome of PB with LBW in infants **(Figures 2–4).**

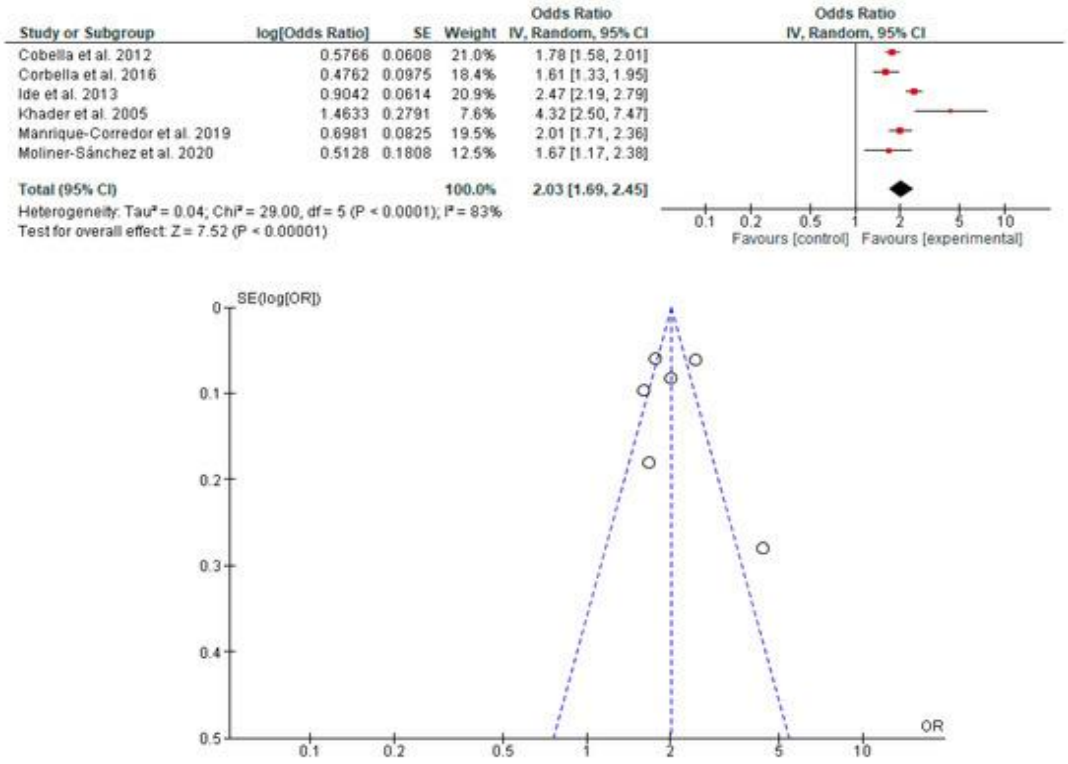

Figure 2. Forest and funnel plots illustrating the relationship between maternal periodontal disease (PD) and the risk of preterm birth (PB) in newborns.

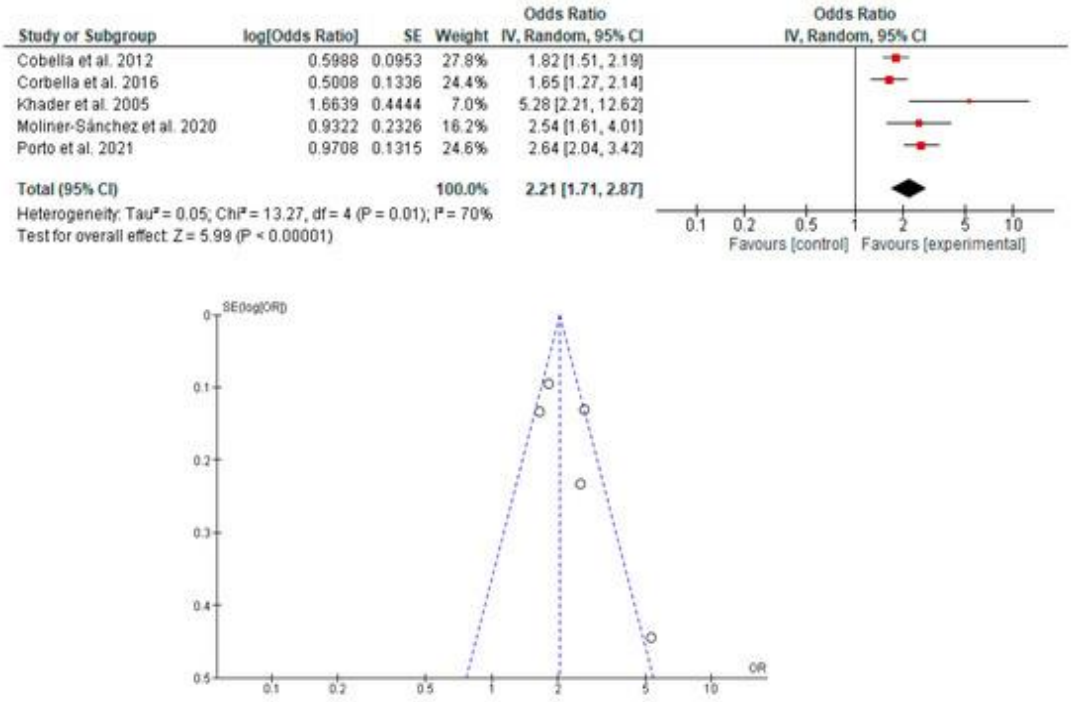

Figure 3. Forest and funnel plots depicting the association between maternal periodontal disease (PD) and the risk of low birth weight (LBW) in newborns.

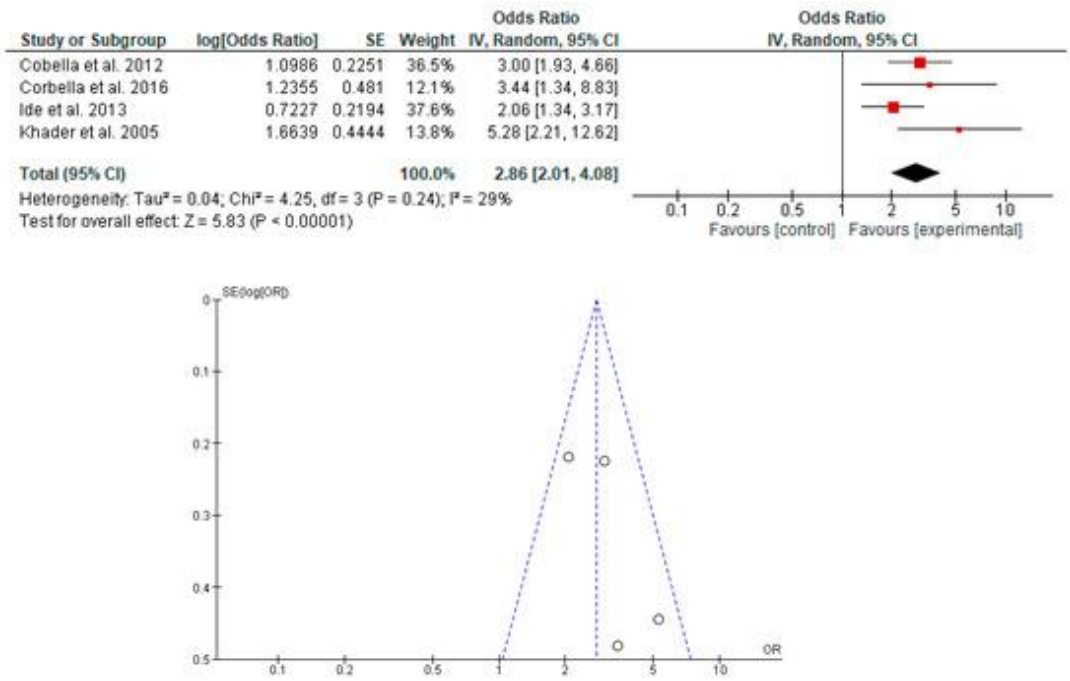

Figure 4. Forest and funnel plots showing the relationship between maternal periodontal disease (PD) and the combined outcome of preterm birth (PB) with low birth weight (LBW) in newborns.

GRADE analysis

Assessment of the included studies using the GRADE approach indicated that the certainty of evidence regarding the association between maternal PD and the risk of PB and LBW in infants ranged from low to moderate **(Table 5).**

Table 5. GRADE analysis.

	Certainty Assessment						
№ of Studies	**Study Design**	**Risk of Bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other Considerations**	**Certainty**
Link between maternal periodontal disease and the risk of preterm birth in newborns							
6	Systematic review	not serious	very serious	not serious	not serious	none	⊕⊕◯◯ Low
Relationship between maternal periodontal disease and the risk of low birth weight in newborns							
5	Systematic review	not serious	very serious	not serious	not serious	none	⊕⊕◯◯ Low
Link between maternal periodontal disease and the combined risk of preterm birth and low birth weight in newborns							
4	Systematic review	not serious	serious	not serious	not serious	none	⊕⊕⊕◯ Moderate

Discussion

In dental practice, diagnostic decisions, treatment planning, and clinical management should be guided by the most reliable scientific evidence, which is typically derived from systematic reviews. A key goal of this review was to evaluate whether the included systematic reviews were well-designed and executed. To support such evaluations, the AMSTAR tool was initially developed in 2007 [32, 46, 47]. Subsequently, to enhance its applicability, experts updated the tool, creating AMSTAR-2 [32, 47], which was applied in this umbrella review.

Some methodological issues were identified among the included reviews. For instance, one study [42] did not implement a comprehensive literature search strategy, while another [45] failed to provide a list of excluded studies. Protocols such as those used in Cochrane reviews recommend that authors report both included and excluded studies to enable readers to critically assess the quality of selected evidence.

Additionally, several studies [21, 24, 25, 43, 44] did not meet certain criteria for high overall confidence, including the lack of duplicate study selection and independent data extraction. These procedural steps are essential for ensuring reliability and should be carefully considered in future systematic reviews.

The findings of this review indicate a clear association between maternal periodontal disease (PD) and the risk of preterm birth (PB) and low birth weight (LBW) in newborns. This relationship may be mediated by inflammatory responses at the placenta–fetal interface, elevated systemic inflammation in pregnant women, or the translocation of periodontopathogenic bacteria into the uteroplacental circulation [48].

The World Health Organization (WHO) has prioritized reducing the incidence of PB and LBW, given their substantial impact on neonatal morbidity and mortality. Addressing these outcomes not only mitigates maternal–fetal complications but also reduces healthcare costs, including hospitalization, intensive care utilization, and long-term preventive care [49-51]. Implementing preventive oral health protocols during pregnancy, from initial visits through subsequent care, may help lower bacterial plaque levels and consequently reduce PB and LBW incidence [52]. These findings underscore the public health relevance of managing PD during pregnancy.

Nevertheless, this review has some limitations. The AMSTAR-2 tool assesses the overall confidence of systematic reviews but does not provide detailed evaluations of the individual studies included within each review. Moreover, the studies capable of establishing an association between maternal PD and PB or LBW employed varying study designs, which may influence the generalizability of results.

Despite these limitations, the review has notable strengths. It represents the first umbrella review using AMSTAR-2 to synthesize evidence on this topic. A comprehensive literature search was conducted across major bibliographic databases, and the conclusions were drawn primarily from systematic reviews with meta-analyses that demonstrated high overall confidence.

Conclusion

Overall, the included systematic reviews were of high methodological confidence. Evidence indicates a significant association between maternal periodontal disease and the risk of PB and LBW in newborns. Specifically, pregnant women with PD are estimated to have a two- to threefold increased likelihood of delivering preterm or low-birth-weight infants.

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Conflict of Interest: None

Financial Support: None

Ethics Statement: None

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