

Systematic Review

Periodontal disease in patients with Down syndrome

A systematic review

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Supplemental material
is available online.

ABSTRACT

Background. The authors systematically reviewed the scientific evidence of an association between periodontal disease and Down syndrome (DS).

Types of Studies Reviewed. In this systematic review, the authors included observational studies in which the investigators assessed the prevalence, incidence, or experience of periodontal disease in patients with DS compared with that in healthy patients. The authors used the Population, Exposure, Comparison, Outcome structure. The population was patients of any age, the exposure was the presence of DS, the comparison was the absence of DS, and the outcome was the presence of periodontal disease. The authors conducted an electronic search in 5 databases through March 2017. Two independent reviewers assessed the risk of bias by using the Fowkes and Fulton scale. The authors performed a meta-analysis to compare periodontal disease among patients with DS and those without DS. The authors calculated a summary effect measure—standard mean difference—when evaluating the means of the oral hygiene index. The authors assessed the strength of evidence from the selected studies by using a modified Grading of Recommendations Assessment, Development and Evaluation system.

Results. The authors included 23 case-control studies in the systematic review and submitted 3 to meta-analysis. In the qualitative analysis, results from most studies showed that the prevalence of some periodontal parameters was higher among patients with DS than among those without DS. Evaluations of the Fowkes and Fulton scale point to many methodological problems in the studies evaluated. Results of the meta-analysis revealed no differences between groups with regard to the oral hygiene index (standard mean difference, 0.05; 95% confidence interval, -0.55 to 0.65 ; $I^2 = 0.0\%$).

Conclusions and Practical Implications. Further research is required, in particular well-designed studies that avoid the deficiencies identified in the studies in this review.

Key Words. Down syndrome; oral health; periodontal diseases.

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Periodontal disease is a multifactorial condition, and investigators have suggested a specific microbiological profile.¹ This condition can manifest in the gingival tissues or affect the supporting tissues of the teeth (periodontal ligament, cementum, and alveolar bone).² Smoking, diabetes, and genetically transmitted characteristics are risk factors for the development of periodontal disease.³

Down syndrome (DS) is a genetic disorder resulting from an error in chromosome distribution during cell division and is one of the most common genetic abnormalities among humans.⁴⁻⁶ People with DS have specific orofacial characteristics, and study investigators have suggested that there is a higher prevalence rate of periodontal disease in this population.⁷ In addition to immunodeficiency, other factors, such as tooth morphology, mouth breathing, malocclusion, and early microbial colonization by periodontal pathogens, may explain the high prevalence and increased severity of periodontal disease in people with DS.⁸⁻¹⁰ Although investigators have reported a higher prevalence rate of periodontal disease in people with DS than in people of the same age without DS or with

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other disabilities,^{11,12} there is no consensus in the literature regarding the prevalence of the disease in this population or which periodontal parameters may be associated with DS.

DS is increasingly the object of study, not only scientifically but also socially. Thus, knowledge about the periodontal status of this group of people with special needs is important and can enhance the effectiveness of preventive and therapeutic measures aimed at minimizing the outcome of periodontal disease in people with DS. To our knowledge, no previous investigators have conducted systematic reviews or meta-analyses on this subject. Therefore, our aim was to conduct a systematic review and meta-analysis to search for scientific evidence of a possible association between DS and periodontal disease.

METHODS

Search strategy

We published the protocol for this systematic review with the International Prospective Register of Systematic Reviews under registration CRD42015025490. This report complies with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.¹³

We used the Population, Exposure, Comparison, Outcome structure to define the eligibility criteria.¹³ The population was patients of any age, the exposure was the presence of DS, the comparison was the absence of DS, and the outcome was the presence of periodontal disease.

The inclusion criteria were observational studies (that is, case-control, cross-sectional, cohort studies) in which the investigators assessed the prevalence, incidence, or experience of periodontal disease in patients with DS compared with that in healthy patients of any age. We included systematic reviews and searched the list of references to try to find original studies not retrieved by means of the electronic search, but we retrieved no systematic reviews. The exclusion criteria were studies in which the investigators reported periodontal disease in patients with DS without a control group, experimental studies, case reports, case series, studies written in a language other than English, studies addressing the prevalence of periodontal disease related to other syndromes, literature reviews, and studies with an outcome other than periodontal disease.

We conducted electronic searches in 5 electronic databases (PubMed, Web of Science, Cochrane Library, Scopus, and Virtual Health Library) through March 2017. Table 1 lists the databases and respective search strategies. We also searched the gray literature in the National Institutes of Health website and conducted hand searches. We imposed no restrictions with regard to date of publication.

Two independent reviewers (F.A.R.S., C.F.C.) used the eligibility criteria to analyze the titles and abstracts. We first performed a calibration exercise with 20% of the retrieved studies, during which we found the level of interobserver agreement was substantial (κ , 0.756), and we considered

ABBREVIATION KEY

ABL:	Alveolar bone loss.
AL:	Attachment loss.
BOP:	Bleeding on probing.
C:	Control patient.
CPITN:	Community Periodontal Index of Treatment Needs.
DS:	Down syndrome.
GB:	Gingival bleeding.
GI:	Gingival index.
GRADE:	Grading of Recommendations Assessment, Development and Evaluation.
MeSH:	Medical Subject Heading.
NA:	Not applicable.
NR:	Not reported.
OHI:	Oral hygiene index.
PD:	Probing depth.
PeI:	Periodontal index.
PI:	Plaque index.
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses.
SC:	Subgingival calculus.
0:	No problem.
+	Minor problem.
++	Major problem.

Table 1. Search strategy used for each electronic database.

ELETRONIC DATABASE	SEARCH STRATEGY
PubMed (http://www.pubmed.gov), Web of Science (http://www.isiknowledge.com)	((periodontal bacteria OR periodontal disease [MeSH*] OR periodontal diseases [MeSH] OR periodontal disease* OR periodontal index [MeSH] OR periodontal indexes [MeSH] OR periodontal pathogens OR periodontitis OR dental plaque [MeSH] OR chronic periodontitis [MeSH]) AND (down syndrome [MeSH] OR trisomy 21 OR mongolism OR trisomy 21 meiotic nondisjunction OR trisomy 21 mitotic nondisjunction OR partial trisomy 21 OR down syndrome))
Cochrane Library (http://cochranelibrary-wiley.com/cochranelibrary/search/)	((periodontal bacteria OR periodontal diseases [MeSH] OR periodontal disease* OR periodontal index [MeSH] OR periodontal index* OR periodontal pathogens OR periodontitis OR dental plaque [MeSH] OR chronic periodontitis [MeSH]) AND (down syndrome [MeSH] OR trisomy 21 OR mongolism OR trisomy 21 meiotic nondisjunction OR trisomy 21 mitotic nondisjunction OR partial trisomy 21 OR down syndrome))
Scopus (https://www.scopus.com)	((periodontal bacteria OR periodontal disease OR periodontal diseases OR periodontal index OR periodontal indexes OR periodontal pathogens OR periodontitis OR dental plaque OR chronic periodontitis) AND (down syndrome OR trisomy 21 OR partial trisomy 21))
Virtual Health Library (www.bireme.br) National Institutes of Health (https://www.nih.gov/)	(periodontal diseases AND down syndrome)

* MeSH: Medical Subject Heading.

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