

## The importance of full text screening when judging eligibility criteria in a systematic review: a systematic survey

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**Aim:** To evaluate if statistically significant results are more likely to be reported in title/abstracts compared to non-significant outcomes.

**Methods:** In this methodological survey, we reanalyzed 59 observational studies from a previous systematic review. The PECO question was: Patient (P): children with primary teeth; Exposure (E): low birth weight and/or preterm; Comparison (C): normal birth weight and/or full-term; Outcome (O): dental caries. We analyzed the presence of key terms in the titles and abstracts, such as gestational age, preterm, full-term, birth weight, low/normal birth weight. Full texts were analyzed for “positive outcomes” (statistically significant association,  $p \leq 0.05$  or 95% CI not crossing the null effect line) related to the association between the outcome and the exposure; and “negative outcomes” (when the outcome had statistically similar occurrence between the exposure and the comparison group). The odds ratio (OR) was calculated between the presence of key terms in titles/abstracts and the type of outcome (positive or negative).

**Results:** Of 59 studies, 66% cited the key terms in titles/abstracts, and 75% reported negative outcomes. Studies with positive outcomes were more likely to report key terms in the titles/abstracts compared to studies with negative outcomes (OR: 4.5; 95% CI: 0.9-22.4; Chi-square test:  $p = 0.06$ ). Studies with statistically significant outcomes, favoring the exposure or the comparison, were more likely to report these data in the titles/abstracts.

**Conclusion:** When conducting a systematic review, the final decision related to the inclusion of a study must be based on a full-text level.

**Uniterms:** Review. Publication bias. Observational studies as topic. Dental caries.

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### INTRODUCTION

The screening process of a systematic review is very important, since it determines the studies that will be included in data analyses. If an eligible study is missed during the screening process, the evidence generated by the systematic review can be biased<sup>1</sup>. Much like

summaries, abstracts should not contain all the relevant information. For this reason, the Cochrane Handbook suggests researchers to be over selective during the screening of titles and abstracts, and only make a final decision at a full-text level; otherwise, spurious scientific evidence may arise due to misconduct in the screening process<sup>1</sup>.

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A Cochrane overview evaluated the selective reporting in systematic reviews of randomized controlled trials (RCTs)<sup>2</sup>. Two studies from this overview evaluated discrepancies between full texts and abstracts of the systematic reviews. About 32% of Cochrane Reviews did not report primary outcomes in the abstract (95% CI: 21% - 45%). Reporting was defined when presenting an effect estimate or at least stating whether the effect estimate was statistically or clinically significant<sup>2</sup>.

As well as systematic reviews, clinical observational studies may not report the outcomes in the abstracts. If an eligible study is excluded during the screening of titles and abstracts, scientific evidence raised by the systematic review might be misleading. Our hypothesis is that positive outcomes (outcomes favoring the exposure (E) or the comparison (C)) are more likely to report key terms related to the outcome (O) of interest in titles/abstracts compared to studies with negative outcomes (non-significant outcome or when the outcome has statistically similar occurrence between the E and C).

To test this hypothesis, this systematic survey evaluated the studies included in a previous systematic review<sup>3</sup>, and checked if positive outcomes are more likely to be reported in titles/abstracts in comparison to negative outcomes in observational studies evaluating dental caries according to the exposure (prematurity and low birth weight).

## **MATERIAL AND METHODS**

This systematic survey reanalyzed 59 clinical observational studies included in a previous systematic review<sup>3</sup>. The PECO question was: Patients (P): children with primary teeth; Exposures (E): born preterm and/or with low birth weight; Comparison (C): born full-term and/or with normal birth weight; Outcome (O): experience of dental caries.

The full systematic review was registered in the PROSPERO database (#CDR42018118086) and published elsewhere<sup>3</sup>. The main finding was that low birth weight and gestational age were not associated with dental caries.

## **INCLUSION CRITERIA AND INFORMATION SOURCES**

With respect to the studies analysed in the present study, all data further described in this topic is referent to the published paper<sup>3</sup> that was used as a basis for this systematic survey. The inclusion criteria were observational studies

(cross-sectional, case-control, or cohort) that evaluated the association between birth weight and/or gestational age and dental caries in primary dentition, with a clinical diagnosis of dental caries. There was no restriction regarding language and date of publication. The exclusion criteria were: letters to the editor, case reports, in vitro studies, animal studies, experimental studies, reviewers, conference abstracts, guidelines, studies in which the diagnosis for dental caries was not performed through a clinical examination (e.g. self-report), and other outcome rather than dental caries.

The electronic search included eight electronic databases from interception up to November 2018: MEDLINE (through PubMed), the Cochrane Library (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials (CENTRAL), and Cochrane Methodology Register), Web of Science (Science and Social Science Citation Index), Scopus, Lilacs, and the Brazilian Library of Dentistry (BBO) through the Virtual Health Library (Bireme, Latin America). Gray literature was searched through Clinical Trials, the UK National Institute for Health and Care Excellence, and the US National Institutes of Health. We also manually searched the reference lists of the included studies. The search strategies details are shown in the published paper<sup>3</sup>.

## **DATA SELECTION AND DATA EXTRACTION**

In a previous study, which was used as a basis for the present analysis, the Reference Manager Software<sup>®</sup> (Reference Manager, ISI ResearchSoft, version 10.0, Berkeley, California, USA) was used to organize the studies and to remove duplicate references. Independent trained and calibrated reviewers screened titles and abstracts using the eligibility criteria. Full texts were analyzed and selected independently by the reviewers after a similar process of calibration. In all stages, disagreements were solved by discussion and consensus.

For the data extraction of the present systematic survey, three paired independent reviewers extracted data (APH, PVC, IGPO-A) that was cross-checked by a fourth reviewer (CCM) when there were disagreements. First, the reviewers analyzed titles/abstracts for key terms, such as: gestational age, preterm, full-term, birth weight, low/normal birth weight. The main variable "key terms in titles/abstracts" was categorized into "yes" if the study reported any of these key terms in the titles/abstracts; or "no" if they were not reported in the titles/abstracts. The studies

could have assessed only one or both exposures (preterm and/ or low birth weight). The comparison could be full term and/ or normal birth weight.

After that, the reviewers independently extracted data from the full text. The variable “outcome” was classified in either positive or negative. “Positive outcome” was considered when there was a statistically significant association between the outcome (dental caries) and E or C. Statistical significance was considered when  $p \leq 0.05$  or 95% CI did not cross the null effect line. Contrarily, “negative outcome” was considered when the outcome had statistically similar occurrence between E and C.

### DATA ANALYSIS

Data was tabulated into the SPSS software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). We

descriptively analyzed the percentage of positive and negative outcomes, as well as the presence of key terms in titles and abstracts. We used the chi-square test and calculated the odds ratio (OR) and 95% CI to assess the presence of the key terms in titles/abstracts according to positive or negative outcome reported in the full text.

### RESULTS

The systematic survey included 59 observational studies. Sixty-six percent of the studies ( $n = 39$ ) cited the key terms in titles/abstracts. Positive outcomes were reported by 25% of the studies (Table 1). Studies with positive outcomes were 4.5 times more likely to report key terms related to the outcome in titles/abstracts compared to studies with non-significant outcomes (OR: 4.5; 95%CI: 0.9-22.4; Chi-square test:  $p = 0.06$ ).

**Table 1.** Frequency distribution of studies according to positive or negative outcomes and the presence of key terms in titles/abstracts.

Outcome	Studies that cited the key terms in titles/abstracts		
	Yes n (%)	No n (%)	Total n (%)
Positive outcome	13 (33.3)	2 (10.0)	15 (25.4)
Negative outcome	26 (66.7)	18 (90.0)	44 (74.6)
Total	39 (100.0)	20 (100.0)	59 (100.0)

### DISCUSSION

In this systematic survey, the majority of the studies reported negative outcomes and cited key terms in titles/abstracts. Although not significant, there was a higher number of studies with positive outcomes reporting related key terms in titles/abstracts compared to studies with negative outcomes. Nearly 35% of the studies did not mention important key terms in titles and abstracts, and if those studies were prematurely excluded during the screening of titles and abstracts, about 1/3 of eligible studies would have been lost.

As confirmed by other systematic survey of RCTs, statistically significant primary outcomes were more likely to be completely reported in the abstract than non-significant outcomes<sup>2</sup>. If review authors do not consider the full text when making their final decision, they might risk losing eligible studies that meet the inclusion criteria, which would mislead scientific evidence. For this reason, systematic review authors should never solely rely on titles and abstracts when evaluating the eligibility of a study<sup>1</sup>. Instead, the decision

must be made, always and only, at a full-text level, otherwise spurious scientific evidence may rise due to misconduct in the screening process.

A recent systematic review addressing a PECO question similar to the present review included 14 studies and the meta-analysis suggested that preterm children are more likely to experience dental caries (OR: 1.48; 95%CI: 1.16-1.89)<sup>4</sup>. By contrast, the systematic review that included 59 studies concluded a lack of association between gestational age and/ or birth weight and dental caries<sup>3</sup>. The scientific discrepancies between both systematic reviews may be due to searching and screening criteria. Although the authors claim to have manually searched the relevant literature<sup>4</sup>, the number of studies that met inclusion criteria is quite below the number of the studies of the other systematic review<sup>3</sup>. Moreover, the authors included only moderate to late preterm birth children (32 to 37 gestational weeks) and limited the search to studies published in the last two decades<sup>4</sup>.

The present survey has some limitations since the analysis was based on clinical studies of a single systematic review<sup>3</sup>. We suspect there

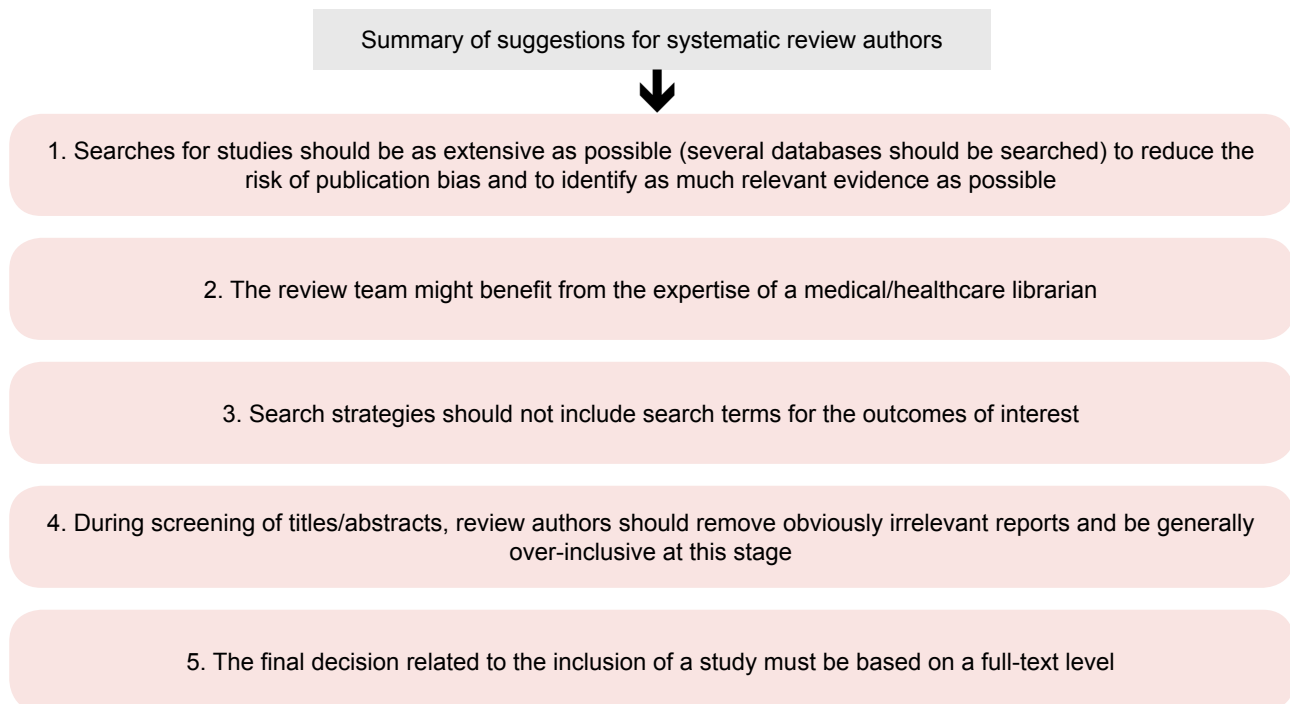
are even more studies with negative outcomes that were not included in the systematic review due to selective reporting bias (when authors do not report negative outcomes on their manuscript due to the direction of the results)<sup>1,2,5</sup>.

## CONCLUSION

Systematic reviews are among the highest level of scientific evidence. However,

dentists must have a critical perspective when using scientific evidence in clinical practice as a tool for patient care decisions. Abstracts should never be used as a source of information, as they are only summaries. Moreover, our survey reinforces that systematic review authors should thoroughly search the literature and make the final eligibility decision based on full texts. Figure 1 summarizes some suggestions for review authors to avoid misleading evidence.


**Figure 1.** Summary of suggestions to increase scientific robustness.



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## A importância da avaliação do texto completo ao julgar os critérios de elegibilidade em uma revisão sistemática: uma revisão de métodos

**Objetivo:** Avaliar se os resultados estatisticamente significativos são mais prováveis de serem relatados nos títulos/resumos dos artigos do que os resultados não significativos.

**Métodos:** Neste levantamento metodológico, foram reanalisados 59 estudos observacionais de uma revisão sistemática anterior. A questão PECO foi: Paciente (P): crianças com dentes decíduos; Exposição (E): baixo peso ao nascer e/ou pré-termo; Comparação (C): peso normal ao nascer e/ou a termo; Resultado (O): cárie dentária. Foi analisada a presença de termos-chave nos títulos/resumos, como idade gestacional, pré-termo, a termo, peso ao nascer, baixo/peso normal ao nascer. Textos completos foram analisados para “desfechos positivos” (associação estatisticamente significativa,  $p < 0,05$  ou IC 95% não cruzando a linha de efeito nulo) relacionados à associação entre o desfecho e a exposição; e “desfechos negativos” (quando o desfecho teve ocorrência estatisticamente semelhante entre a exposição e o grupo de comparação). Foi calculada a odds ratio (OR) entre a presença de termos-chave nos títulos/resumos e o tipo de resultado (positivo ou negativo).

**Resultados:** Dos 59 estudos, 66% citaram os termos-chave nos títulos/resumos e 75% relataram resultados negativos. Estudos com resultados positivos foram mais propensos a relatar os termos-chave nos títulos/resumos em comparação com estudos com resultados negativos (OR: 4,5; IC 95%: 0,9-22,4; teste do qui-quadrado:  $p = 0,06$ ). Estudos com significância estatística os desfechos, favorecendo a exposição ou a comparação, foram mais propensos a relatar esses dados nos títulos/resumos.

**Conclusão:** Ao realizar uma revisão sistemática, a decisão final quanto à inclusão de um estudo deve ser baseada por meio da análise do texto completo.

**Descritores:** Revisão. Viés de publicação. Estudos observacionais como assunto. Cárie dentária.