

Characteristics of systematic reviews published in dentistry by Brazilian corresponding authors

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ABSTRACT | INTRODUCTION: This study aimed to analyze the reporting and conduct characteristics of systematic reviews (SRs) published in dentistry by Brazilian corresponding authors and compare reporting characteristics of Brazilian SRs with the rest of the world. **METHODS:** A search in PubMed was performed to identify SRs published in dentistry in 2017 assessing different aspects of oral health irrespective of the design of included studies. From this dataset, a subgroup analysis was performed considering only SRs published by Brazilian corresponding authors. Study screening was performed by two researchers independently, while for data extraction, one of three reviewers extracted details related to reporting and conduct of SRs. The completeness of reporting of 24 characteristics, included in the PRISMA Statement of the SRs classified as treatment/therapeutic, was evaluated comparing Brazilian SR to SRs from all other countries. **RESULTS:** We included 117 SRs with Brazilian corresponding authors. The majority focused on dental treatments (39.3%), with oral surgery (n=19, 16.2%) as the most commonly published. Included SRs presented varying reporting/conduct characteristics. Items such as use of reporting guidelines and screening method used were well reported. However, most SRs did not assess the risk of publication bias and did not use the GRADE assessment. Four (of 24) reporting characteristics of Brazilian SRs compared to SRs from the rest of world were reported statistically significantly more frequently: mention of a SR protocol, trial registry searched, screening method reported, and assessment of risk of bias/quality of studies. **CONCLUSION:** Reporting and conduct characteristics of Brazilian SRs are highly variable.

KEYWORDS: Dentistry. Systematic review. Research report.

Introduction

Systematic reviews (SRs) are considered an important tool for collating and summarizing available knowledge, facilitating the use of evidence-based treatments, and identifying research gaps^{1,2}. Recently, studies demonstrated an increasing number of SRs published in different medical areas^{3,4}, including dentistry^{5,6}. These studies corroborate that most SRs are poorly conducted, reported and/or unnecessary.

Saltaji et al. demonstrated that between 1991 and 2012, Brazil was the 7th most common country from which SRs in dentistry originated from⁶, whereas recently Bassani et al. showed that Brazil became the number one country for SRs indexed in 2017 in PubMed⁵. However, there is no data exploring whether this exponential increase in SR production was also accompanied by an improvement in reporting and conduct. Thus, this study sought to characterize the reporting and conduct characteristics of SRs published in dentistry by Brazilian authors and compare reporting characteristics of Brazilian SRs to those published by authors originating in all other countries in the world.

Material and Methods

We used a database of SRs previously assembled consisting of SRs in dentistry indexed in PubMed in 2017 worldwide⁵. We performed a subgroup analysis considering only SRs published by Brazilian corresponding authors and compared these with SRs published by corresponding authors of all other countries.

Search strategy

Details of the search strategy and eligibility criteria are available in the study by Bassani et al.⁵. Briefly, a search was performed in PubMed limited to SRs published in English and indexed between January 2017 and December 2017. The search strategy was drafted based on MeSH terms of PubMed and a specific filter (U.S. National Library of Medicine) to retrieve reports of SRs (**Table 1**).

Table 1. Search strategy

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"Oral Health"[Mesh] OR "Oral Health" OR "Health, Oral" OR "Dentistry"[Mesh] OR "Dentistry" OR "Dental Research"[Mesh] OR "Dental Research" AND (((systematic review [ti] OR meta-analysis [pt] OR meta-analysis [ti] OR systematic literature review [ti] OR this systematic review [tw] OR pooling project [tw] OR (systematic review [tiab] AND review [pt]) OR meta synthesis [ti] OR meta synthesis [ti] OR integrative review [tw] OR integrative research review [tw] OR rapid review [tw] OR consensus development conference [pt] OR practice guideline [pt] OR drug class reviews [ti] OR cochrane database syst rev [ta] OR acp journal club [ta] OR health technol assess [ta] OR evid rep technol assess summ [ta] OR jbi database system rev implement rep [ta] OR (clinical guideline [tw] AND management [tw]) OR ((evidence based[ti] OR evidence-based medicine [mh] OR best practice* [ti] OR evidence synthesis [tiab]) AND (review [pt] OR diseases category[mh] OR behavior and behavior mechanisms [mh] OR therapeutics [mh] OR evaluation studies[pt] OR validation studies[pt] OR guideline [pt] OR pmcbook)) OR ((systematic [tw] OR systematically [tw] OR critical [tiab] OR (study selection [tw]) OR (predetermined [tw] OR inclusion [tw] AND criteri* [tw]) OR exclusion criteri* [tw] OR main outcome measures [tw] OR standard of care [tw] OR standards of care [tw]) AND (survey [tiab] OR surveys [tiab] OR overview* [tw] OR review [tiab] OR reviews [tiab] OR search* [tw] OR handsearch [tw] OR analysis [ti] OR critique [tiab] OR appraisal [tw] OR (reduction [tw]AND (risk [mh] OR risk [tw]) AND (death OR recurrence))) AND (literature [tiab] OR articles [tiab] OR publications [tiab] OR publication [tiab] OR bibliography [tiab] OR bibliographies [tiab] OR published [tiab] OR pooled data [tw] OR unpublished [tw] OR citation [tw] OR citations [tw] ,OR database [tiab] OR internet [tiab] OR textbooks [tiab] OR references [tw] OR scales [tw] OR papers [tw] OR datasets [tw] OR trials [tiab] OR meta-analy* [tw] OR (clinical [tiab] AND studies [tiab]) OR treatment outcome [mh] OR treatment outcome [tw] OR pmcbook)) NOT (letter [pt] OR newspaper article [pt]))
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Eligibility criteria

The eligibility criteria included SRs published in dentistry assessing different aspects of oral health, such as diagnosis, prevention and/or treatment of diseases, disorders and/or conditions of the oral cavity, maxillofacial and/or adjacent area, and associated structures regardless of the design of included studies. We excluded other types of reviews, such as narrative/non-systematic literature reviews, rapid reviews, overviews of reviews (or umbrella reviews), scoping reviews, methodology articles evaluating quality of studies (which may have used systematic methods to identify studies), comments and protocols for SRs, or summaries of SRs.

Screening

The results of the electronic search were uploaded to reference manager software (EndNote X7, Thomson Reuters, New York, USA) where the study screening was performed. Details surrounding how a pilot test screen and subsequent study selection were performed are available in the study by Bassani et al.⁵. Briefly, we followed the four-phase flow based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement⁷ and the screening was carried out by two researchers (RB and RSO) independently.

Data extraction

We created a standardized form using Microsoft Excel based on the data extraction form developed by Page et al.⁴. Details about how a pilot test of data extraction was performed is available elsewhere⁵. Data from each SR were extracted by one of three reviewers (RB, GKR, RSO).

In the present analysis, we focused on the following data: dental specialty, SR focus (epidemiology, diagnosis, prevention, prognosis, treatment/therapeutic, other or unclear), category of the journal (general or specialty journal), number of authors, number of included studies, details related to administrative information, study eligibility criteria, search methods, screening methods, data extraction methods, risk of bias assessment methods, statistical methods, limitations, conclusions, and funding of the review.

Data analysis

We performed a descriptive analysis comparing SRs published by Brazilian corresponding authors to SRs published by corresponding authors based in all other countries. Data were summarized as frequency and percentage for categorical variables or median and interquartile range for continuous variables using Stata 14.2 software.

In addition, we analyzed the completeness of reporting of 24 characteristics of SRs classified as treatment/therapeutic comparing Brazilian SRs and non-Brazilian SRs. All these domains are included in the PRISMA Statement and were selected because they can be categorized dichotomously as “reported” versus “not reported”. The proportion of SRs with adequate reporting of these items was calculated. Employing these proportions, we compared the completeness of reporting between Brazilian SRs versus non-Brazilian SRs calculating a Relative Risk (RR) with a 95% confidence interval for each characteristic. The analysis was performed in Review Manager (RevMan Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014).

Results

The initial search yielded 495 SRs and in the present analysis, we included 117 SRs with Brazilian corresponding authors (**Figure 1**). Details about the included SRs and exclusion is available in Bassani et al.⁵. **Table 2** presents the characteristics of Brazilian SRs indexed in PubMed in 2017. The main specialty was oral surgery (n=19, 16.2%) followed by periodontics (n=18, 15.4%). Forty-six (39.6%) SRs were classified as treatment/therapeutic. Most SRs were published in a specialty journal (n=86, 73.5%). The median number of authors was five (IQR: 4–6) and the median number of included studies was 12 (IQR: 8–34). No Cochrane reviews were published in the period by Brazilian corresponding authors.

Figure 1. Flow diagram of study selection



PRISMA 2009 Flow Diagram

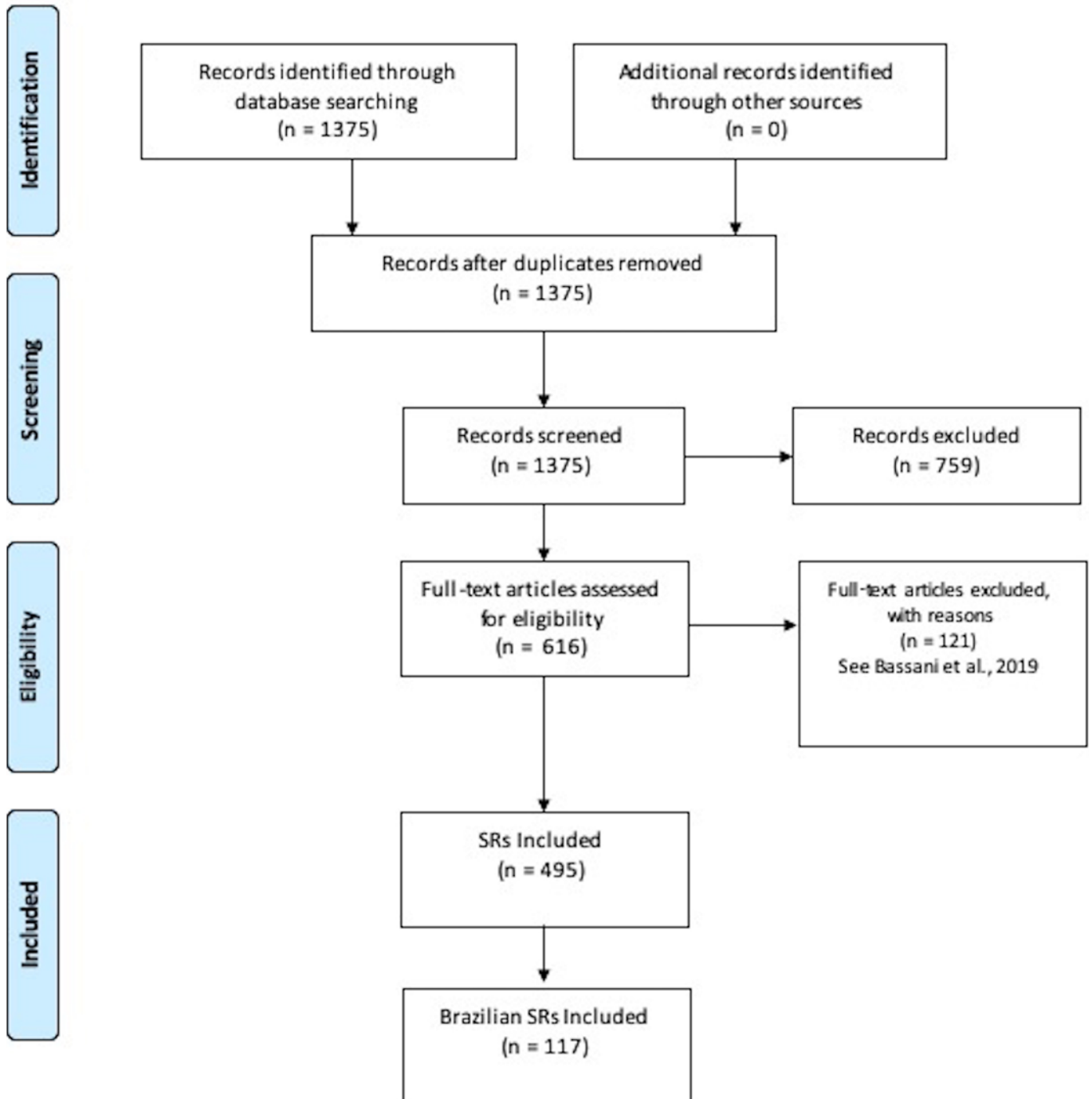


Table 2. Characteristics of Brazilian SRs indexed in PubMed in 2017

Total of SRs	117	
CHARACTERISTICS	n*	%**
Dental specialties		
Oral surgery	19	16.2%
Periodontics	18	15.4%
Oral pathology and stomatology	15	12.8%
Implantology	14	12%
Restorative and Esthetic dentistry	14	12%
Endodontics	10	8.5%
Pediatric dentistry	9	7.7%
Radiology	6	5.3%
Orthodontics	5	4.3%
Prosthodontics	3	2.6%
Public Health	3	2.6%
Other	1	0.8%
Primary focus		
Treatment/Therapeutic	46	39.3%
Diagnosis	25	21.4%
Prognosis	14	12%
Epidemiology	12	10.3%
Other	12	10.3%
Unclear	5	4.3%
Prevention	3	2.6%
Journal		
General	31	26.5%
Specialty	86	73.5%

Reporting characteristics

Table 3 features the reporting characteristics of Brazilian SRs indexed in PubMed in 2017. The use of descriptive terms, such as "systematic review", "meta analysis" or both were reported by the majority of SRs (n=111, 94.8%). Most included studies mentioned the protocol registration (n=65, 55.6%), reported the use of the PRISMA Statement as a reporting guideline (n=93, 79.5%) and described the use of Cochrane methods (n=74, 63.2%). With regards to study eligibility criteria, only 27 SRs (23.1%) included published and unpublished studies and 59 SRs (50.4%) included all languages. Forty-four SRs (37.6%) reported eligible and ineligible study designs.

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (to be continued)

CHARACTERISTICS	n*	%**
ADMINISTRATIVE INFORMATION		
Terms in title		
Systematic review	52	44.4%
"Systematic review and meta-analysis"	49	41.9%
Meta-analysis	10	8.5%
Neither	6	5.1%
SR registration		
Yes	65	55.6%
No	52	44.4%
Use of reporting guideline		
PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)	93	79.5%
None	20	17.1%
Other	3	2.6%
MOOSE (Meta-analyses Of Observational Studies in Epidemiology)	1	0.8%
Cochrane methods used		
No	74	63.2%
Yes	43	36.7%

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (continuation)

CHARACTERISTICS	n*	%**
STUDY ELIGIBILITY CRITERIA		
Eligible publication status		
Only published studies	55	47%
Not reported	35	29.9%
Both published and unpublished	27	23.1%
Eligible language		
All languages	59	50.4%
English only	38	32.5%
Mixed: English and a specific language	10	8.5%
Not reported	7	6%
Languages other than English only	3	2.6%
Eligibility/ineligibility criteria based on studies designs		
Only eligible study design was reported	52	44.4%
Both eligible and ineligible	44	37.6%
Not reported	15	12.8%
Only ineligible study	6	5.1%
SEARCH METHOD		
Number of databases median (IQR)	4	(3-5)
Years of coverage reported		
Yes - start and end dates were reported	73	62.4%
No restrictions were applied	21	17.9%
Not reported	15	12.8%
Partially	8	6.8%

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (continuation)

CHARACTERISTICS	n*	%**
Search terms reported		
Full Boolean search logic was reported for one or more database	61	52.1%
Only free text words were reported	18	15.4%
Only main index terms (e.g. MeSH) were reported	17	14.5%
Both main index terms and free text words were listed, but no full Boolean search logic was reported	11	9.4%
No search terms were reported	6	5.1%
Readers are referred elsewhere for full search strategy	4	3.4%
Trial registry searched	29	(24.8%)
Number of other sources searched	1	(0-1)
SCREENING, EXTRACTION, AND RISK OF BIAS ASSESSMENT METHODS		
Screening method		
All titles/abstracts and full text articles were screened by two reviewers independently	85	72.6%
All titles/abstracts and full text articles were screened by one reviewer, and a second reviewer screened a sample of records	3	2.5%
All titles/abstracts and full text articles were screened by only one reviewer	1	0.8%
Different method applied to titles/abstracts and full text articles	1	0.8%
Two reviewers screened records for eligibility, but authors did not specify whether this method was applied independently to both titles/abstracts AND full text articles	8	6.8%
Not reported	10	8.5%
Other	9	7.7%

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (continuation)

CHARACTERISTICS	n*	%**
Data extraction method		
Two reviewers independently extracted data from all studies	69	59%
Not reported	26	22.2%
Other	16	13.7%
Two reviewers extracted data from all studies, but authors did not state whether extraction was done independently	6	5.1%
Study risk of bias/quality formally assessed	101	86.3%
Study risk of bias/quality assessment method		
Two reviewers independently assessed all studies	51	50.5%
Not reported	42	41.6%
Two reviewers assessed all studies, but authors did not state whether assessment was done independently	6	5.9%
Other	2	2%
Study risk of bias/quality assessment incorporated into meta-analysis	28/63	44.4%
INCLUDED/EXCLUDED STUDIES		
Review flow reported		
Review flow was reported in text/table and in a PRISMA/QUOROM-like flow diagram	95	81.2%
Only reported in a PRISMA/QUOROM-like flow diagram	14	12%
Not reported	6	5.1%
Review flow was only reported in text/table	2	1.7%
STATISTICAL METHODS		
Two or more studies synthesized statistically	63	53.8%
Meta-analysis model used		
Fixed-effect model for all meta-analyses	10	16.4%
Random-effects model for all meta-analyses	36	59%
Varied	12	19.7%
Other	2	3.3%
Not reported	1	1.6%

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (continuation)

CHARACTERISTICS	n*	%**
Statistical heterogeneity investigated		
No	16	21%
Yes	59	77.6%
Heterogeneity of the studies was qualitatively assessed	1	1.3%
Heterogeneity statistic inappropriately guided choice of meta-analysis model (e.g., random-effects model selected if I² > 50%)	33/67	49.2%
Risk of publication bias assessed (or intent to assess)		
Publication bias was not assessed	82	70.1%
Not assessed, but authors planned to if they identified a sufficient number of studies	11	9.4%
Yes, publication bias was assessed	24	20.5%
Possibility of publication bias discussed/considered in results, discussion, or conclusion	22	19%
LIMITATIONS, CONCLUSIONS AND FUNDING		
GRADE assessment reported in a summary of findings table or text	14/83	16.9%
Limitations reported		
No limitations were reported	73	62.9%
Yes – both limitations at the study level and review level were reported	18	15.5%
Yes – only limitations at the review level were reported	9	7.7%
Yes – only limitations at the study level were reported	16	13.8%

Table 3. Reporting characteristics of Brazilian SRs indexed in PubMed in 2017 (conclusion)

CHARACTERISTICS	n*	%**
Study risk of bias/quality/limitations incorporated into SR abstract conclusions	5/46	10.9%
Source of funding		
Authors specified there was no funding	46	39.3%
For-profit sponsor	2	1.71
Non-profit sponsor	32	27.3%
Not reported	37	31.6%

Legend

* the column 'n' indicates the total amount of studies considered on such characteristic (described on each line).

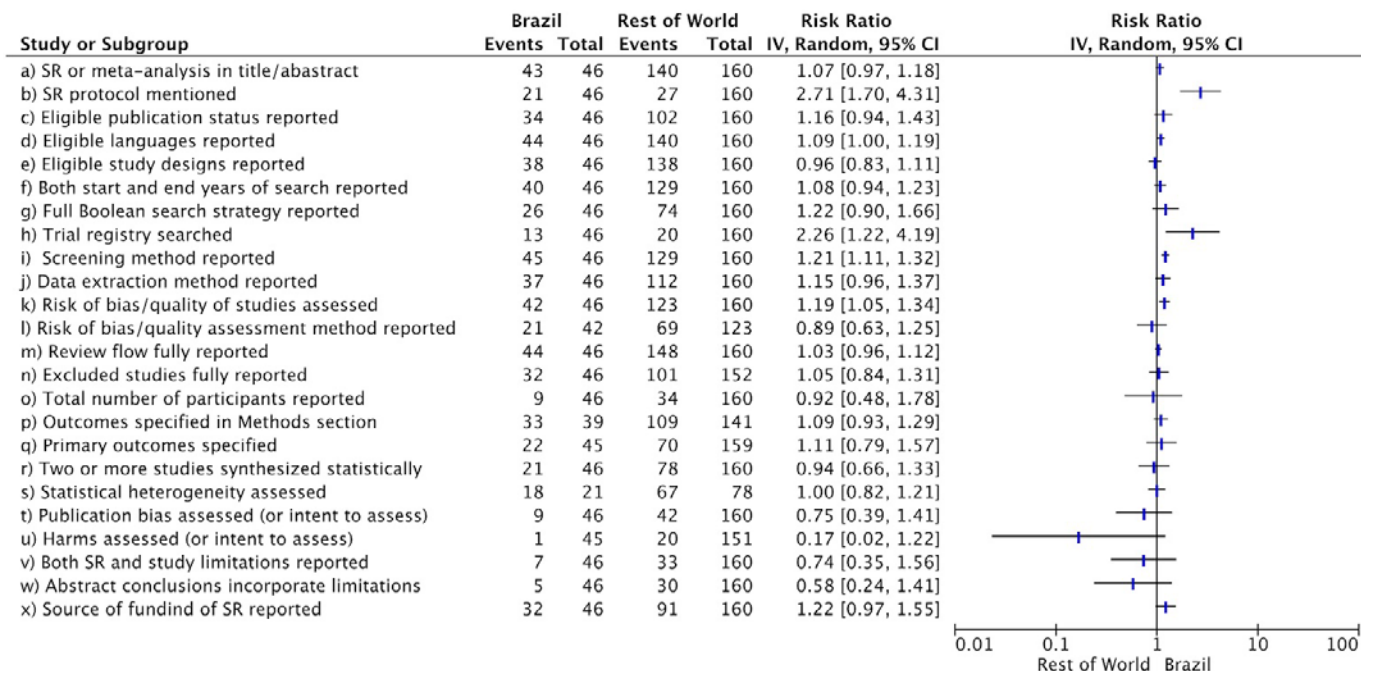
** the column '%' indicates the percentage of the studies that presented such characteristic.

Related to search methods, the median number of databases searched was 4 (IQR 3-5). Most SRs (n=61, 52.1%) reported the full Boolean search logic for at least one database and a small proportion of SRs (n=29, 24.8%) reported searches in trial registry databases. Most SRs (n=85, 72.6%) reported using screening methods such that all titles/abstracts and full-text articles were screened by two reviewers independently and using data extraction methods such that two reviewers independently extracted data from all studies (n=69, 59%). Most SRs (n=101, 86.3%) described assessing the risk of bias/quality of included studies. However, a large number of SRs (n=42, 41.6%) did not mention the risk of bias/quality assessment method.

The majority of SRs (n=95, 81.2%) reported the review flow in the text/table and using a PRISMA-like flow diagram. Sixty-three (53.8%) mentioned that two or more studies were synthesized statistically, and among these, 36 (59%) reported the use of a random-effects model for all meta-analyses. Eighty-two SRs (70.1%) did not assess publication bias and only a small proportion of SRs (n=22, 19%) discussed/considered in the results, discussion, or conclusion the possibility of publication bias. Only 16.9% of SRs (n=14/83) reported the use of the GRADE assessment. Most SRs did not mention limitations (n=73, 62.9%) and only a few SRs (5/46, 10.9%) incorporated study risk of bias/quality/limitations into SR abstract conclusions. Thirty-seven SRs (31.6%) did not report the source of funding.

Figure 2 shows that only four reporting characteristics were described as statistically significantly more prevalent in Brazilian SRs versus SRs originating from all other countries. On the other hand, no characteristic was found to be statistically significantly less prevalent for the Brazilian SRs.

Figure 2. Pooled relative risks across assessed reporting characteristics of treatment/therapeutic SRs with 95% confidence intervals comparing the completeness of reporting between Brazilian versus SRs of rest of world



Discussion

Our study demonstrated that SRs published by Brazilian authors presented variable reporting and conduct characteristics. Items such as use of reporting guidelines and screening method were well reported in Brazilian SRs. However, it is noteworthy (and worrisome) that most Brazilian SRs did not assess the risk of publication bias, did not use the GRADE assessment tool, and did not report limitations. The high variability of reporting and conduct characteristics depicted in SRs worldwide was demonstrated in previous studies³⁻⁶, and the main problem related to this is that they may result in articles that are unfit for their purpose⁸. Specifically comparing Brazilian SRs and those from the rest of the world, it was shown that only four reporting characteristics were statistically better reported, and thus the majority of items were reported at a similar frequency as SRs originating from other countries.

The number of articles published with authors from Brazil increased over time. Based on data from SCImago and considering Latin America, Brazil has the greatest number of articles published annually in dentistry and is second in the world in terms of number of published dental articles since 2006. In 2017, almost 2,000 dental citable documents were published in the Scopus database by Brazilian corresponding authors⁹. Recently, Bassani et al., analyzing the same database used in the current study, showed that in 2017, 495 SRs in dentistry were indexed in PubMed, with 117 (23.63%) from Brazil⁵. This exponential increase in publications originating in Brazil could be explained by government policies related to the expansion of the number of graduate programs and incentive to increase the number of researchers with PhD degrees. Although more funding opportunities have been available in Brazil over the last 10 years, these other previously mentioned policies prioritize quantitative numbers instead of quality aspects. When analyzing the performance of researchers for career progressions for grant proposal and scholarships, quantitative aspects (i.e., publish or perish) are still considered ahead of qualitative aspects (number of publications versus ensuring that the researchers have the skills to conduct and report research adequately)^{10,11}. This quality versus quantity research outputs have been discussed in the last couple of years and will probably generate different government policies in Brazilian funding agencies, but this movement is still very embryonic.

Brazil is a large continental country with 101 graduate programs in dentistry and a large number of dental schools concentrated in the southeast and south regions of the country^{10, 12}. In an attempt to produce greater amounts of research with scarce funding, SRs offer a viable option to comply with such governmental policies because SRs are of lower cost when compared to conducting some types of primary research, such as randomized trials. Also, considering low-income, lower-middle-income, and upper-middle-income economies, SRs could be considered a research methodology appropriate for these settings. However, the high variability of reporting and conduct characteristics demonstrates that there is room for improvement in the conduct and reporting of SRs in dentistry. As well, many SRs reported did not mention the prospective registration of protocol, which could be generating duplicate and unnecessary studies.

Gonçalves et al., showed that among the top 100 most-cited Brazilian dental articles, 25 were classified as reviews, among which only two employed the term, "systematic review", in the title and most of the other self-referenced themselves as "critical reviews" or "state of the art"¹³. This fact demonstrates that Brazilian SRs have not been gaining prominence in the oral health literature and this could be related to suboptimal reporting and conduct quality. Thus, it becomes clear that great effort should be exerted to improve SR conduct and reporting characteristics.

One important aspect to highlight is that despite Brazil being responsible the greatest number of SRs published in dentistry and hosting a Cochrane center, no Cochrane SRs were published by Brazilian authors during the period of our investigation. This scenario highlights the need to encourage a more dynamic and facilitated relationship between Brazilian researchers and Cochrane centers, which should focus on stimulating inclusive, interdisciplinary approaches to qualify conduct and reporting of SRs performed within the country. In addition, another reason could be related to the perception that Cochrane reviews take a longer time to get published.

There are limitations of our study. The number of SRs published by Brazilians is likely an underestimate because we searched only one database, included only SRs published in English, and classified as Brazilian SRs based only on corresponding authors. In addition, the analysis was based on the reporting of the SR and some SRs could have been performed more rigorously than was specified in the report.

Finally, we believe that researchers, universities, funding agencies and journals have an important role in the improvement of reporting and conduct of SRs. Here are some suggestions to be addressed:

- 1) Researchers and students should be trained to make SRs fit for purpose;
- 2) Universities and funding agencies should encourage students and researchers to publish with a focus on quality instead quantity;
- 3) The analysis of researchers' performance for appointments and for granting funding and scholarships should be based on quality aspects and robust research practices, such as use of reporting guidelines, prospective registration of SR protocols, and data sharing;
- 4) Brazilian funding agencies should promote grants for knowledge synthesis, thereby encouraging robust research practices.
- 5) Brazilian journals should recommend the prospective registration of SR protocols as well as the use of the PRISMA Statement during manuscript preparation and as part of the peer-review process.

Conclusion

Reporting and conduct characteristics of Brazilian SRs present high variability. Poor reporting and conduct could generate imprecise and biased results, but this trend occurred not only in Brazilian reviews, but worldwide. Brazilian researchers, universities, funding agencies, and journals have important roles in the improvement of reporting and conduct of SRs.

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Author contributions

Sarkis-Onofre R, Bassani R and Pereira G were responsible for the study design, data collection and analysis and writing of the manuscript. Pereira-Cenci T, Cenci M, Moher D, Page MJ, Tricco AC helped in the conceptualization of the project, critically reviewed the manuscript and were involved in the drafting and editing of the manuscript.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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