Critical Assessment of Search Strategies in Systematic Reviews in Endodontics

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Abstract

Introduction: The aim of this study was to perform an overview of literature search strategies in systematic reviews (SRs) published in 2 endodontic journals, *Journal of Endodontics* and *International Endodontic Journal*. **Methods:** A search was done by using the MEDLINE (PubMed interface) database to retrieve the articles published between January 1, 2000 and December 31, 2015. The last search was on January 10, 2016. All the SRs published in the 2 journals were retrieved and screened. Eligible SRs were assessed by using 11 questions about search strategies in the SRs that were adapted from 2 guidelines (ie, AMSTAR checklist and the Cochrane Handbook). **Results:** A total of 83 SRs were retrieved by electronic search. Of these, 55 were from the *Journal of Endodontics*, and 28 were from the *International Endodontic Journal*. After screening, 2 SRs were excluded, and 81 SRs were included in the study. Some issues, such as search of grey literature and contact with study authors, were not fully reported (30% and 25%, respectively). On the other hand, some issues, such as the use of index terms and key words and search in at least 2 databases, were reported in most of the SRs (97% and 95%, respectively). The overall quality of the search strategy in both journals was 61%. No significant difference was found between the 2 journals in terms of evaluation criteria ($P > .05$). **Conclusions:** There exist areas for improving the quality of reporting of search strategies in SRs; for example, grey literature should be searched for unpublished studies, no language limitation should be applied to databases, and authors should make an attempt to contact the authors of included studies to obtain further relevant information. *(J Endod 2016;42:854–860)*

Key Words

Endodontics, search strategies, systematic review

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Evidence-based medicine is the process of systematically reviewing, critically appraising, and using research findings to aid the delivery of optimum clinical care to patients (1). Systematic reviews (SRs) are a component of evidence-based medicine and are defined as reviews of the available evidence on an explicitly formulated research question that uses systematic methods to find and critically appraise selected studies as well as include and synthesize the included research studies (2). SRs provide the best evidence for clinical exercise. Particularly in the last decade, SRs have emerged as an important tool in the health sciences. The main advantage of SRs over narrative review is that properly conducted SRs should provide a more unbiased answer to a clinical question or problem. Processes such as systematic literature searching and a search strategy, critical appraisal of the studies, and data synthesis are not usually described in narrative reviews; therefore, narrative reviews are much more prone to bias than SRs.

The search strategy is an essential step of an SR process to search for evidence. Inaccuracy in search strategies can affect the sensitivity of the search and can lead to missed studies and inadequate conclusions. Indeed, Robinson and Dickersin (3) have reported that a search strategy should be highly sensitive and answer the research question clearly by means of inclusion criteria to yield unbiased results. Similarly, Jadad et al (4) have indicated that reporting a search strategy clearly and adequately indicates the quality of the search and validity and reliability of the methodology of the SR; they also emphasized the importance of a search strategy in an SR. Also, it has been pointed out that explicitly reporting the search strategy explicitly allows reproduction of the search when the review is updated (4). Insufficient inclusion of studies or errors in the literature review because of a poorly designed search strategy lead to certain biases, such as publication bias, language bias, location bias, and questionable outcomes on the legitimacy of the evidence. *Publication bias* is a term that refers to a bias where researchers publish only positive or statistically significant effects as opposed to studies with non-significant outcomes (5). Also, articles written in non-English languages are often overlooked. Thus, language bias and location bias can occur if relevant studies cannot be retrieved. These biases can negatively affect the legitimacy and validity of the outcomes.

Although SRs are of great importance in providing the best evidence, the character of the SRs conducted has been a cause for concern. Hence, some guidelines, including Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (6), Assessment of Multiple Systematic Reviews (AMSTAR) (7), Cochrane Handbook (8), STARLITE (9), MOOSE (10), and QUADAS (11) have been prepared both to standardize conducting SRs and to increase quality of SRs (6, 7, 12, 13). In these guidelines, some criteria have been proposed to conduct an adequate search strategy. For example, AMSTAR has recommended searching at least 2 databases. Similarly, it has been pointed out that a search of the MEDLINE database alone is not considered adequate (14) and should be enriched with handsearching and searching grey literature, which requires a search of unpublished papers (8). Because broad searching of databases does not retrieve all relevant articles, searches should be enriched by checking the reference lists of relevant articles (15).

Because an increasing number of SRs have been conducted in recent years, there remains a demand for an appraisal of the search strategies used in reviews. To date, no study has been performed to appraise the search strategies of SRs published in 2 leading endodontics journals, *Journal of Endodontics* (JOE) and *International Endodontic Journal* (IEJ). Therefore, the aim of the present study was to evaluate the standard search strategies used in SRs that were published in these journals.

Materials and Methods

Eligibility Criteria

SRs with and without meta-analysis in endodontics were included. Narrative reviews were excluded.

Literature Search

The search was carried out by the 2 review authors by using the MEDLINE (PubMed interface) electronic database to retrieve the articles published between January 1, 2000 and December 31, 2015 in JOE and IEJ. The last search was on January 10, 2016. The exact search strategy used for retrieving the articles was as follows for each journal:

"Journal of endodontics"[ta] AND ("systematic review" OR "meta-analysis")

"International endodontic journal"[ta] AND ("systematic review" OR "meta-analysis").

An additional search was performed by using webpages of the journals to identify SRs that were in press.

Assessment of Search Strategies

Included SRs were evaluated by using 11 questions about search strategies in the eligible SRs that were adapted from 2 validated sources (ie, the AMSTAR checklist and the Cochrane Handbook) (7, 16) and used previous studies (17, 18). The questions were as follows:

1. Did the authors of SRs explicitly report MESH terms and key words used to search for primary studies?
2. Did the authors search in at least 2 electronic databases?
3. Did the authors report the date of search?
4. Did the authors report years covered by search?
5. Did the authors report any interface to search in the electronic databases?
6. Did the authors search the grey literature, namely information that is not published in easily accessible journals or databases, such as conference proceedings that include the abstracts of research presented at conferences or unpublished theses?
7. Did the authors report a complete search strategy?
8. Did the authors report a 1- or 2-sentence summary of search strategy?
9. Did the authors perform "hand-searching," which includes searching reviews, textbooks, reviewing the references of the selected studies?
10. Did the search strategy include all languages without restriction?
11. Did the authors make any attempt to contact the authors of primary studies to obtain further relevant information?

Data Extraction

The 2 review authors assessed independently the retrieved articles according to the 11 questions. The questions were answered dichotomously: YES (the authors stated the answer adequately), NO (the authors stated the answer inadequately). Any disagreement was solved through discussion. In the first screening, only the titles were evaluated. In the second screening, the full text of potential eligible articles was examined. The data were entered in an *ad hoc* extraction form according to the assessment questions. Authors of included studies were contacted via e-mail to request further information.

Comparison of the Journals

Search strategies in both journals were evaluated. The data were analyzed by using SPSS software version 15.0 for Windows (SPSS Inc, Chicago, IL). The frequency of 11 questions answered with YES in the 2 groups was analyzed by using the Fisher exact test. *P* values less than .05 were considered statistically significant.

Evaluation

The evaluation was performed for each SR by using an *ad hoc* assessment form (Fig. 1). Search strategy descriptions of each SR were checked for the presence and absence of these 11 criteria. In the evaluation, we considered the AMSTAR guideline (7) and the Cochrane Handbook (8). According to the AMSTAR guideline and the Cochrane Handbook, authors should report MESH terms and key words that they used in their search, and authors should search at least 2 electronic databases. Moreover, authors should indicate the name of the databases searched (ie, Embase or MEDLINE) and the name of the interface on which the database is provided (ie, PubMed or Ovid). The date of search should include month, day, and year. Furthermore, authors should give a search strategy summary. Finally, authors should contact the authors of primary studies for further data. The search strategy should include all languages without restriction.

Results

Our searches retrieved a total of 83 records from 2 journals. Of these, 55 SRs were in JOE, and 28 SRs were in IEJ. Two articles were excluded from JOE because they were not SRs (19, 20). Finally, 81 SRs were included in the study. Of these, 53 SRs (65%) were from JOE (21–73), and 28 SRs (35%) were from IEJ (74–101). Authors of included studies were contacted via e-mail. Fourteen authors responded to request for information (32, 40, 44–47, 60, 61, 75, 83–87). No statistically significant difference was found between the 2 journals in terms of overall search strategy assessment elements ($P > .05$). Furthermore, no statistically significant difference was found between the 2 journals in terms of each search strategy element, although there was a substantial difference in number of SRs ($P > .05$).

Of the analyzed 81 SRs, only 1 SR (95) contained all 11 search elements, and 7 SRs (9%) included 10 of 11 questions (29, 32, 34, 38, 58, 89, 92). The rest of the SRs (83%) included 9 and fewer elements. The overall quality of the search strategy in both journals was 61%. To find the overall quality, we added up all the values (percentages) together and divided by the number of the assessment elements (11 elements).

Explicitly reporting MESH terms and key words used to search for primary studies was the most frequently included element (97%). On the other hand, any attempt to contact the authors of relevant articles to achieve more information was the most frequently missing element (24%). The authors used different databases (34 databases). Among electronic databases, MEDLINE was the most commonly used database (Table 1). Authors in 9 SRs (11%) used only 1 electronic database in their literature search, 22 SRs (27%) used 2 databases, and the remaining 50 SRs searched 3 or more databases. Dates of search were reported in 29 SRs (36%). Years covered by the searches were reported in 77 SRs (95%). The interface of electronic databases was reported in 57 SRs (70%). Attempts to search grey literature were detailed in 24 SRs (30%), and a complete search strategy was reported in 58 SRs (72%). A 1- or 2-sentence summary of the search strategy was reported in 29 SRs (36%). Manual searching was performed in 70 SRs (86%), and searching in all languages was performed in 25 SRs (31%). Fifty-six SRs (69%) focused on only the English language. Eleven SRs (14%) did not give any information on the limitations of searching only 1 language.