Methodological and Reporting Quality of Systematic Reviews and Meta-analyses in Endodontics

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Abstract

Introduction: The aim of this systematic review (SR) was to evaluate the quality of SRs and meta-analyses (MAs) in endodontics. **Methods:** A comprehensive literature search was conducted to identify relevant articles in the electronic databases from January 2000 to June 2017. Two reviewers independently assessed the articles for eligibility and data extraction. SRs and MAs on interventional studies with a minimum of 2 therapeutic strategies in endodontics were included in this SR. Methodologic and reporting quality were assessed using A Measurement Tool to Assess Systematic Reviews (AMSTAR) and Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA), respectively. The interobserver reliability was calculated using the Cohen kappa statistic. Statistical analysis with the level of significance at $P < .05$ was performed using Kruskal-Wallis tests and simple linear regression analysis. **Results:** A total of 30 articles were selected for the current SR. Using AMSTAR, the item related to the scientific quality of studies used in conclusion was adhered by less than 40% of studies. Using PRISMA, 3 items were reported by less than 40% of studies, which were on objectives, protocol registration, and funding. No association was evident comparing the number of authors and country with quality. Statistical significance was observed when quality was compared among journals, with studies published as Cochrane reviews superior to those published in other journals. AMSTAR and PRISMA scores were significantly related. **Conclusions:** SRs in endodontics showed variability in both methodologic and reporting quality. *(J Endod 2018;44:903–913)*

Key Words

Endodontics, meta-analysis, systematic review

Significance

This SR identifies the strengths and weaknesses in published SRs in endodontics and highlights areas for improvement. Strict adherence to the established guidelines on quality will lead to accurate and reliable reporting of evidence.

A systematic review (SR) is typically a well-designed, unbiased collective scientific update on a particular topic or intervention summarizing individual studies based on defined criteria (1, 2). SRs often synthesize individual studies to comprehensively examine an intervention's effectiveness and thus may help in the betterment of clinical decision making (3, 4); consequently, SRs are often used to establish practice guidelines and recommendations (5–7). A meta-analysis (MA) is a statistical procedure to combine data from reasonably similar studies to synthesize a single estimate of effect and determine overall treatment efficacy across individual trials (8, 9).

The validity and reliability of any conclusion arrived at in an SR depends on how the process was conducted. An appropriate methodology is essential for valid interpretation and application of the findings of an SR in clinical practice. Thus, assessing the methodologic quality of an SR assumes paramount importance.

Shea et al (10) developed a tool called A Measurement Tool to Assess Systematic Reviews (AMSTAR) to objectively, critically, and reproducibly assess the methodologic quality of SRs. AMSTAR is a validated tool and has been used to assess the quality of SRs in various disciplines (11–14). The so-called Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) checklist defined and explained in the PRISMA statement is an important tool developed to address the reporting quality of SRs. The reporting quality of SRs has been previously assessed by this tool (15); PRISMA has 27 checklist items and pertains to the content of an SR and MA (15). Because of an exponential increase in the number of SRs published in various areas of dentistry, there is a need for assessing the quality. SRs with methodologic flaws limit their value to guide decisions (16). In fact, the quality of SRs published in the literature has been assessed and reported in various health care areas (13, 14, 17–19). Faggion et al (20) evaluated various approaches used to assess the quality of included studies in SRs of interventions in periodontology and implant dentistry. Suebnukarn et al (19) and Kattan et al (21) assessed the quality of MAs published in endodontics using the AMSTAR tool.

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0099-2399/$ - see front matter

https://doi.org/10.1016/j.joen.2018.02.013

Despite the relevance of such information in the context of evidence-based clinical practice, there is limited information about the methodologic and reporting quality of SRs published in endodontics. Hence, the aims of our study are 2-fold:

1. To evaluate the methodologic and reporting quality of SRs and MAs of interventions in endodontics by AMSTAR and PRISMA, respectively
2. To identify any relationship that exists between the authors, country, journal, and time of publication to the methodologic and reporting quality of SRs and MAs

Materials and Methods

Registration and Protocol

An a priori review protocol was designed and approved by the International Medical University Joint Committee on Research and Ethics, Kuala Lumpur, Malaysia (project identification no. IMU 394/2017).

Literature Search

The relevant endodontic specialty journals were identified by the h5 index of Google Scholar Metrics (22). Articles published in English from January 1, 2000, to June 30, 2017, were screened using PubMed and EBSCOHOST (Dentistry & Oral Sciences Source) electronic databases. The following terms were used in the search strategy: Selected "Journal Name" AND ("systematic review" OR "meta-analysis"). The Cochrane database was searched using (root canal OR endodontic OR pulp) as search strategy. A hand search was performed from the reference lists of the SRs to identify potentially eligible studies.

Inclusion and Exclusion Criteria

SRs with an MA of clinical interventional studies published in the scope of endodontics in endodontics journals and assessing a minimum of 2 therapeutic strategies were included. SRs on topics other than interventions (eg, prevalence studies, *in vitro* studies, or animal studies) were excluded. SRs published in non–peer-reviewed journals or books were also excluded from this study.

Study Selection and Data Extraction Process

The search was independently performed by 2 trained examiners (V.N. and S.J.). Both reviewers checked the inclusion and exclusion criteria for the selected studies, and disagreements regarding the study selection were resolved with the help of the third reviewer (J.J.). A data extraction form was created, and data were retrieved independently by 2 reviewers (V.N. and S.J.). Any disagreement between the 2 primary reviewers was resolved jointly with the help of the third reviewer (J.J.).

Quality Appraisal

The criteria for the assessment of SRs were based on 2 aspects: methodologic and reporting quality. To assess the methodologic quality, the AMSTAR tool was used. This tool consists of a list of 11 items and has been reported to have good face and content validity (10). Likewise, the reporting of SRs was assessed according to the PRISMA checklist (15). This tool includes 27 items: 1 item for Title, 2 items for Abstract, 13 items for Methods, 7 items for Discussion, 3 items in Results, and 1 related to Funding. A score of 1 was given to each item if the study satisfied the criteria of the item. If the item was not reported or found to be inadequate, no score was given similar to the method used in previous studies (11, 13). In case of unclear or missing data in the included SRs, the corresponding author was contacted. No score was given in the event of a negative or nonresponse from the authors. The maximum score for AMSTAR (11 items) and PRISMA (27 items) for SRs were 11 and 27, respectively. Based on the summary scores of AMSTAR and PRISMA, the quality of the SRs was categorized into 3 groups (23): low (up to the 25th percentile), moderate (the interquartile range), and high (the 75th percentile and above). To examine the agreement between the 2 independent reviewers, the agreement proportion and the Cohen kappa value for each of the 11 AMSTAR and 27 PRISMA items were calculated. The scores evaluated by our team were shared with the authors of the selected studies to correct any possible misinterpretation.

Statistical Analysis

The collected data were analyzed using IBM SPSS Version 23.0 software (IBM Corp, Armonk, NY). To describe the data descriptive statistics, frequency analysis and percentage analysis were used for categoric variables, whereas means and standard deviation were used for continuous variables. Multivariate analysis was performed using Kruskal-Wallis tests followed by post hoc analysis as appropriate. Simple linear regression analysis following scatter plots was used to find the relationship between the AMSTAR and PRISMA scores. Statistical significance was set at a P value $<.05$.

Results

Literature Search

Based on the h5 index of Google Scholar Metrics (22), the journals identified in endodontics were *Journal of Endodontics*, *International Endodontic Journal*, *Australian Endodontic Journal*, *Restorative Dentistry and Endodontics*, *Iranian Endodontic Journal*, *Endodontic Topics*, *Endodontic Practice Today*, *Saudi Endodontic Journal*, and *Dental Press Endodontics*. The identified journal name was used as a key word as described in the search strategy. The PRISMA study flow diagram (Fig. 1) shows the entire process of the article search. A total of 7223 articles were excluded after screening by title and abstract. After a full-text review, an additional 32 articles were excluded. The reasons for exclusion were as follows:

1. An MA was not performed (19 studies) (24–42).
2. Intervention studies were not included in the SR (7 studies) (43–49).
3. SRs were performed with *in vitro* studies (5 studies) (50–54).
4. No SR or MA (1 study) (55).

Finally, 30 articles (56–85) qualified for the current study.

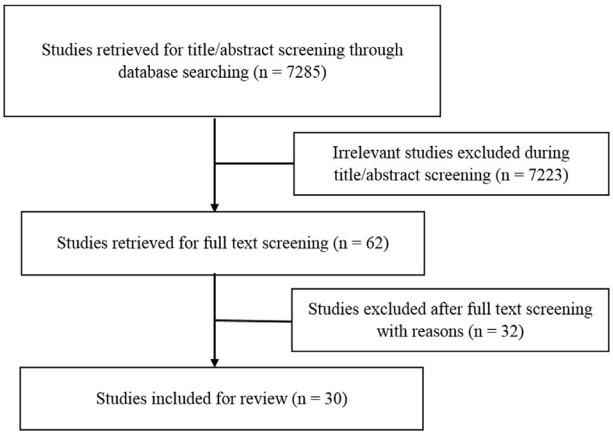

Figure 1. The PRISMA flow diagram.