Review Article

Methodological Quality Assessment of Meta-analyses in Endodontics

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Abstract

Introduction: The objectives of this review were to assess the methodological quality of published meta-analyses related to endodontics using the assessment of multiple systematic reviews (AMSTAR) tool and to provide a follow-up to previously published reviews. **Methods:** Three electronic databases were searched for eligible studies according to the inclusion and exclusion criteria: Embase via Ovid, The Cochrane Library, and Scopus. The electronic search was amended by a hand search of 6 dental journals (*International Endodontic Journal*; *Journal of Endodontics*; *Australian Endodontic Journal*; *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology*; *Endodontics and Dental Traumatology*; and *Journal of Dental Research*). The searches were conducted to include articles published after July 2009, and the deadline for inclusion of the meta-analyses was November 30, 2016. The AMSTAR assessment tool was used to evaluate the methodological quality of all included studies. **Results:** A total of 36 reports of meta-analyses were included. The overall quality of the meta-analyses reports was found to be medium, with an estimated mean overall AMSTAR score of 7.25 (95% confidence interval, 6.59–7.90). The most poorly assessed areas were providing an a priori design, the assessment of the status of publication, and publication bias. **Conclusions:** In recent publications in the field of endodontics, the overall quality of the reported meta-analyses is medium according to AMSTAR. *(J Endod 2017;■:1–10)*

Key Words

Assessment of multiple systematic reviews, endodontics, meta-analysis, methodologic quality

Significance

The overall quality of the reported meta-analyses (from August 1, 2009–November 30, 2016) was found to be medium, with an AMSTAR score of 7.25 out of 11. There are clear needs for authors' self-evaluation and incorporation of the AMSTAR checklist for the review process before publication.

Systematic reviews and meta-analyses (SRs/MAs) are on the highest level of the evidence hierarchy scale in medical science (1). SRs/MAs have become the benchmark for assessing and summarizing applied health research and are often used for decision making in health care (2). However, the quality of SRs/MAs has received relatively little attention. The quality of systematic reviews with major methodological flaws can lead to false conclusions about evidence, which might have a negative impact on decision-making processes.

Several tools have been developed to assess the methodological quality of SRs/MAs. One measurement tool for the assessment of multiple systematic reviews (AMSTAR) was created based on the most commonly used instruments in the literature (3). The AMSTAR tool assesses 11 relevant methodology domains directly related to the necessary steps to be taken when performing a systematic review. The authors of the AMSTAR checklist explicitly stated the rationale for the inclusion of each item with clear definitions and guidance on the use of the items to evaluate a systematic review. All definitions are listed in Table 1. AMSTAR checklist items are presented in the form of questions, with possible responses of yes (item/question fully addressed), no (item/question not addressed), cannot answer (not enough information to answer the question), and not applicable. As a result, the quality of the investigated methodology of an individual SR/MA gets a cumulative numeric value from 0 to 11. AMSTAR characterizes quality at 3 levels: high, medium, and low. It has been shown to have a good inter-rater agreement, test-retest reliability, construct validity, and feasibility to assess the quality of systematic reviews, performing equally or better than similar tools in these areas (4). Furthermore, AMSTAR has been endorsed as the best way to assess the methodological quality of SRs/MAs by the Canadian Agency for Drugs and Technologies in Health (5).

Various studies across the medical specialties have exposed weaknesses in the quality of SRs/MAs by applying this tool (6–9). In endodontics, the overall quality of reports of meta-analyses published between January 1, 2001, and July 31, 2009, was evaluated using AMSTAR (10). The results indicated that the overall quality of reports addressing topics related to endodontics is generally high with an AMSTAR score of 8.33 out of 11. It has been speculated that the high quality of reporting might be because of the strict implementation of well-accepted guidelines such as the Quality of Reporting of Meta-Analyses statement to improve the quality of reports (10).

The aims of this review were to assess the methodological quality of meta-analyses related to endodontics published between August 1, 2009, and November 30, 2016,

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TABLE 1. A Measurement Tool to Assess Systematic Reviews (AMSTAR) Score Results

AMSTAR question	Yes (item/question fully addressed) (%)	Cannot answer (not enough information to answer the question) (%)	No (item/question not addressed) (%)	Not applicable (%)
1. Was an "a priori" design provided? The research question and inclusion criteria should be established before the conduct of the review. *Note: need to refer to a protocol, ethics approval, or predetermined/a priori published research objectives to score a "yes."*	10/36 (27.8)	0/36 (0)	26/36 (72.2)	0/36 (0)
2. Was there duplicate study selection and data extraction? There should be at least 2 independent data extractors and a consensus procedure for disagreements should be in place. *Note: 2 people do study selection, 2 people do data extraction, consensus process or one person checks the other's work.*	36/36 (100)	0/36 (0)	0/36 (0)	0/36 (0)
3. Was a comprehensive literature search performed? At least 2 electronic sources should be searched. The report must include years and databases used (eg, Central, Embase, and MEDLINE). Key words and/or Medical Subject Headings terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study and by reviewing the references in the studies found. *Note: If at least 2 sources + 1 supplementary strategy used, select "yes" (Cochrane register/Central counts as 2 sources; a grey literature search counts as supplementary).*	33/36 (91.67)	0/36 (0)	3/36 (8.33)	0/36 (0)
4. Was the status of publication (ie, gray literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language, etc. *Note: If review indicates that there was a search for "gray literature" or "unpublished literature" indicate "yes." SINGLE database, dissertations, conference proceedings, and trial registries are all considered gray for this purpose. If searching a source that contains both gray and nongray, must specify that they were searching for gray/unpublished lit.*	13/36 (36.11)	0/36 (0)	23/36 (68.89)	0/36 (0)
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided. *Note: acceptable if the excluded studies are referenced. If there is an electronic link to the list but the link is dead, select "no."*	19/36 (52.78)	0/36 (0)	17/36 (47.22)	0/36 (0)
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions, and outcomes. The ranges of characteristics in all the studies analyzed (eg, age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases) should be reported. *Note: acceptable if not in table format as long as they are described as above.*	35/36 (97.22)	0/36 (0)	1/36 (2.78)	0/36 (0)
7. Was the scientific quality of the included studies assessed and documented? "A priori" methods of assessment should be provided (eg, for effectiveness studies if the author[s] chose to include only randomized, double-blind, placebo-controlled studies, or allocation concealment as inclusion criteria); for other types of studies, alternative items will be relevant. *Note: can include use of a quality scoring tool or checklist (eg, Jadad scale, risk of bias, sensitivity analysis, etc) or a description of quality items, with some kind of result for EACH study ("low" or "high" is fine, as long as it is clear which studies scored "low" and which scored "high"; a summary score/range for all studies is not acceptable).*	25/36 (69.44)	0/36 (0)	11/36 (30.56)	0/36 (0)