Methodological Approaches for Assessing Certainty of the Evidence in Umbrella Reviews: a Systematic Review

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Research

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Abstract

Objective: To identify and describe the methodological approaches for assessing the certainty of the evidence in umbrella reviews (URs) of meta-analyses (MAs).

Study Design and Setting: We included URs that included SR-MAs of interventions and non-interventions. We searched from 3 databases including PubMed, Embase, and The Cochrane Library from 2010 to 2020.

Results: 138 URs have been included consisting of 96 and 42 URs of interventions and non-interventions, respectively. Only 31 (32.3%) of URs of interventions assessed certainty of evidence, in which the GRADE approach was the most frequently used method (N=20, 64.5%) followed by credibility assessments (N=6, 12.9%). Conversely, thirty (71.4%) of URs of non-interventions assessed certainty of evidence, in which the criteria for credibility assessment were mainly used (N=28; 93%). URs published in journals with high journal impact factor (JIF) are more likely to assess certainty of evidence than URs published in low JIFs.

Conclusions: Only one-third of URs that included MAs of experimental designs have assessed the certainty of the evidence in contrast to the majority of the URs of observational studies. Therefore, guidance and standards are required to ensure the methodological rigor and consistency of certainty of evidence assessment for URs.

Introduction

The number of systematic reviews and meta-analysis (SR-MAs) of interventions have increased dramatically over recent years [1]. Due to the increasing number of SR-MAs, the necessity of compiling and updating evidence from these into one accessible and usable document by an umbrella review (UR) has substantially increased over the last decade [2]. Those SRs and MAs may focus on a single treatment comparison and outcome mostly, the UR, also known as overview of reviews, can summarize and even synthesize the findings of all existing treatment regimens and outcomes [1, 2]. As a result, the URs are considered as the source of the highest level of evidence in biomedical literature [2].

Although some methodological standards for SR-MAs can also be applied to URs (e.g., search strategy, study selection, data extraction, etc.) the methods used to assess the certainty of the evidence in the URs are different. In addition, URs are more heterogeneous than original SR-MAs because not only they address a wider range of questions but also a variety of the assessment methods has been used to establish the evidence. For instance, some URs use the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach, which was originally designed for assessing the certainty of evidence of primary studies included in SRs, not the UR [3]. According to this approach, the certainty is rated ambiguously due to limitations in several domains, e.g., risk of bias, indirectness of evidence, heterogeneity, and imprecision or publication bias. Some URs used the criteria from Physical Activity Guidelines Advisory Committee (PAGAC) to grade the evidence based on applicability, generalizability, risk of bias or study limitations, quantity, consistency (of the results across the available studies), and magnitude and precision of effect sizes [4–6]. Additionally, some URs reported the certainty of the included SRs and MAs as originally reported from each study without further assessment [7–9]. Aromataris et al. [10] also developed and published a methodological guidance focusing on conducting and reporting an umbrella review, but not uncertainty of evidence of UR.

Furthermore, the UR of SR-MAs is more challenging as they usually report summary statistical data as one of the objective criteria to grade the certainty of evidence. Recently, the relatively strict criteria for stratifying evidence using several statistical parameters (i.e., p-value, predictive interval, small-study effects, and excess significance bias) have also been used and suggested as the good practical tips for conducting good URs [2]. To our knowledge, no formal guidance for assessing the certainty of evidence in URs exists. Therefore, this study aims to identify and describe the methodological approaches for assessing the certainty of the evidence in published URs.

Methods

This systematic review was conducted according to the methods pre-specified in a registered protocol (PROSPERO registration: CRD42020203273).

Search strategy and selection criteria

We searched three databases including PubMed, Embase, and The Cochrane Library from May 2010 to May 2020. The keyword 'umbrella review' was used. The full search strategies without language restriction are described in **Supplement 1**. Manual searches of the reference lists of the eligible articles were also performed. We defined an UR as the review that is designed to summarize the evidence from multiple SR-MAs that were labeled as 'umbrella review' in the title or abstract of the article.

At least two reviewers (SS, KT, NP, SN, and SP) independently reviewed the titles, abstracts, and full texts for their potential inclusion against the eligibility criteria. Any disagreement was resolved by consensus with a third reviewer (NC). URs, overview of SR-MAs, review of SR-MAs were selected if they were (a) URs of MAs of intervention or therapy and (b) URs of MAs of non-intervention or therapy. First, we broadly categorized the retrieved URs into two separate categories- (a) UR of meta-analyses of intervention or therapy and (b) UR of meta-analyses of non-intervention or therapy. For the first category, we included URs into this study if they included MAs of experimental designs (i.e., randomized controlled trials (RCTs) and non-RCTs) that focused on the pooling effect sizes of interventions in prevention or treatment purpose. These interventions could be any of drugs, surgical techniques, changes in treatment/diet/policy, counseling, and modifiable risk factors (for example- smoking, alcoholism, substance abuse etc.). Again, the second category included those URs of MAs of non-intervention studies involving diagnostic/risk/prognostic factors of diseases or health conditions, disease etiology, prevalence or incidence; in which most studies were observational studies, e.g., cohort, case-control, and cross-sectional studies [11].

Other types of studies or reviews (e.g., handbooks, guidelines, commentaries, editorials, and methodological studies), materials for poster presentations, URs with network MAs, UR of SRs without MAs, and protocols of URs were excluded.

Data extraction

At least two of five reviewers (SS, NP, SN, KT, and SP) independently extracted the data from each UR into a customized data extraction table. Any disagreement was resolved by consensus with a third reviewer (NC). Details of data extraction are described in **Supplement 2**.

The assessment of the certainty of evidence was defined as any of evaluation of the totality or strength of the evidence such as the GRADE approach, criteria for credibility assessment, Agency for Healthcare Research and Quality (AHRQ) methods for systematic review, and other approaches used to grade the overall body of the UR evidence.

Data synthesis and analysis

A descriptive analysis of the methodological approaches for assessing the certainty of evidence in the URs was performed by frequencies and percentage stratified by intervention and non-intervention URs. The included URs were classified into high and low impact sources based on the journal impact factors (JIF) reported by the Institute of Scientific Information's Journals Citation Report in 2019 [12]. The journals reported as the top 100 highest ranking for the therapeutic and non-therapeutic fields were defined as the high, otherwise they were classified as low impact groups. In addition, we also classified based on a median JIF, i.e., high if the URs were published in $JIF \geq \text{median}$, otherwise the URs were classified as lower impact groups. When feasible, we further compared URs published between 2010–2015 with those published from 2016 to 2020. Chi-square or Fisher's exact test where appropriated was applied to compare characteristics of URs between groups. All analyses were performed using STATA version 15.0 (College Station, TX), $p\text{-value} \leq 0.05$ was considered as statistical significance. We analyzed data and presented the results separately for two aforementioned categories of URs (URs of MA of intervention studies and URs of MA of non-intervention studies).

Results

Search results

We identified 1767 articles, of which 174 and 1282 articles were excluded due to duplicates and during screening titles/abstracts, respectively: leaving 311 studies for the full-text review. A total of 138 URs matched with the eligibility criteria and were finally included in our study (Fig. 1). Among them, 96 and 42 were URs for interventions and non-interventions [5, 6, 8, 9, 13–146], respectively. The reasons for exclusion of the 173 articles after full-text review were described in detail in **Supplement 3**.

Characteristics of included URs

Table 1 and **Supplement 4** summarize the characteristics of the 96 URs of SR-MAs of interventions. The number of URs increased over time from 1 in 2011 to 20 in 2020, with the majority being published in the recent 5 years (2016–2020), ($N = 85$, 88.5%). Forty-five (46.9%) included only SR-MAs of RCTs whereas the rest URs mixed SR-MAs of RCTs and non-RCTs. A median number of included SR-MAs in URs was 7 (Interquartile range (IQR): 2–21). Forty-five URs reported the number of primary studies included in MAs with a median of 123 primary studies (IQR: 20–255). Only 5 URs (5.2%) were classified into high impact group [61, 71, 119, 128, 146]. The median of JIF was 2.74 (IQR: 1.92–4.05).

Table 1
Description of included umbrella reviews

Description	Response, n (%)	
	UR of intervention studies (n = 96)	UR of non-interventional studies (n = 42)
Year published		
2011–2015	11 (11.5)	41 (97.6)
2016–2020	85 (88.5)	1 (2.4)
Number of meta-analysis included in URs, median (IQR)	7 (2–21)	31(17–61)
Number of primary studies included in meta-analysis median (IQR)	128 (20–255)	388 (54-1354)
Number of study participants, range	46 to 992,129	11 to 225,000,000
Journal impact factor (IF), median (IQR)	2.74 (1.91–4.08)	4.99 (2.49–8.31)
Journal publication		
Published in High impact groups (Top 100 journal impact factor)	5 (5.2)	6 (14.3)
Published in lower impact groups	91 (94.8)	36 (85.7)
Characteristics of Included URs		
URs with meta-analysis of only RCTs	45 (46.9)	NA
URs with meta-analysis of RCTs and other experimental studies	51 (53.1)	NA
Assessment of the certainty of the evidence		
Performed by umbrella review authors	31 (32.3)	30 (71.4)
Not performed by umbrella review authors	65 (67.8)	12 (28.6)
- Reported the certainty level as originally reported from the included SR/MA	2	12
Tools used for assessing certainty of the evidence (n = 31)		
GRADE approach	20 (64.5)	14 (7)
Criteria for credibility assessment (2 studies performed both credibility assessment and GRADE)	6 (12.9)	28 (93)
2018 Physical Activity Guidelines Advisory Committee (PAGAC) Recommendations	2 (6.5)	NA
Other tools	3 (9.7)	NA
Author's own tools	2 (6.5)	NA
Methodological quality assessment		
Performed by umbrella review authors	84 (87.5)	26 (61.9)

Description	Response, n (%)	
	UR of intervention studies (n = 96)	UR of non-interventional studies (n = 42)
Not performed by umbrella review authors	12 (12.5)	16 (38.1)
Tools used for assessing methodological quality	(n = 84)	(n = 26)
AMSTAR	40 (47.6)	13 (50)
AMSTAR 2	13 (15.5)	6 (23.1)
JB critical appraisal checklist for SRs	6 (7.1)	6 (23.1)
ROBIS	4 (4.8)	NA
Modified AMSTAR (e.g., AMSTARExBP)	3 (3.6)	NA
Critical appraisal tool for systematic reviews based on Centre for Evidence-Based Medicine (CEBM) recommendations	3 (3.6)	NA
Methodological Quality Checklist (MQC)	3 (3.6)	NA
Oxman and Guyatt Overview Quality Assessment Questionnaire (OQAQ)	3 (3.6)	NA
Other tools	9 (10.7)	1 (3.8)
- NIH Quality Assessment tool	2	NA
- PRISMA 2009 Checklist quality assessment tool	2	NA
- Scottish Intercollegiate Guidelines Network (SIGN) tool	2	NA
- The tool for assessing quality of meta-analyses described by Higgins and colleagues	1	NA
- The Critical Appraisal Checklist for Systematic Reviews developed by the Umbrella Review Methodology Working Group (Aromataris et al)	1	NA
- Author's own criteria	1	NA
- Newcastle Ottawa Scale	NA	1

The characteristics of 42 URs of SR-MAs of non-interventions are also summarized in Table 1 and **Supplement 4** [13–54]. All except 1 URs were published between 2010–2015. Most URs (88.1%) were conducted on SR-MAs of analytic observational studies evaluating etiology, diagnostic/prognostic biomarkers, or other non-modifiable risk factors of a disease or health condition, the remaining URs focused on disease prevalence/ incidence (7.1%), risk prediction models (4.8%). The median number of MAs included in these corresponding URs were 31 (IQR: 17–61), The median of total number of primary studies included were 388 (IQR: 54-1354). Six of the 42 URs (14.3%) were published in high impact factor journals. The median JIF was 4.99 (IQR: 2.49–8.31).

Methodological approaches for assessing certainty of the evidence

Of 96 URs of SR-MAs of interventions, only 31 (32.3%) assessed the certainty of the evidence, see Table 1. GRADE approach was the most frequently used method for assessing the certainty of the evidence (N = 20, 64.5%) followed by credibility assessments (N = 6, 12.9%), see Fig. 2. Criteria for the credibility assessment were varied across studies, as shown in Table 2. For instance, convincing evidence was graded based on the number of cases included in each MA of ≥ 350 to ≥ 5000 or p-values of $< 10^{-6}$ or even < 0.001 . Of five URs published in high-impact journal group [61, 71, 119, 128, 146], the assessment of certainty of the evidence was performed in three studies using GRADE approach and criteria for credibility assessment. Compared with the other two URs [61, 71] that did not assess the certainty of the evidence, these three studies were published more recently (published in 2019–2020 compared with 2014–2016). Table 3 showed the certainty and methodological quality assessment in URs. Based on the median of JIF, the percent URs that assessed the certainty of evidence was significantly higher in the high impact group ($IF > 2.74$) than the lower impact group ($IF \leq 2.74$), i.e., 44.7% vs 20.4%, $p = 0.01$. Comparing the period of 2016–2020 with 2010–2015, the percent URs with certainty of the evidence assessments was significantly higher in a period of 2016–2020 than 2010–2015 (36.5% vs $n = 0\%$, $p = 0.02$).

Table 2

Details of credibility assessment criteria used in umbrella reviews published in higher impact factor journals

Details of criteria	Criteria for credibility assessment of each study					
	Dragioti E, 2017 ⁽⁷³⁾	Dragioti E, 2018 ⁽⁹⁰⁾	Chakranon P, 2019 ⁽¹¹⁴⁾	Kim JY, 2019 ⁽¹²⁰⁾	Dinu M, 2020 ⁽¹³¹⁾	Barbui C, 2020 ⁽¹²⁸⁾
1. Number of categories (label used)	4 (Class I-IV)	5 (convincing, highly suggestive, suggestive, weak, no evidence)	4 (convincing, highly suggestive, suggestive, weak)	3 (convincing, suggestive, weak evidence)	5 (convincing, highly suggestive, suggestive, weak, no evidence)	5 (convincing, highly suggestive, suggestive, weak, non-significant association)
2. Details of each category						
2.1 Convincing/class I						
Number of cases	> 1000	> 350	> 1000	> 1000	≥ 5000	> 1000
P-value	$P < 10^{-6}$	$P < 10^{-6}$	$P < 0.001$	$P < 0.001$	$P \leq 0.001$	$P < 10^{-6}$
95% prediction interval excluded null	Used	Used	Not used	Used	Used	Used
Heterogeneity	$I^2 < 50\%$	$I^2 < 50\%$	$I^2 < 50\%$	$I^2 < 50\%$	$I^2 < 50\%$	$I^2 < 50\%$
No evidence of small-study effects	Used	Used	Used	Used	Used	Used
No evidence of excess significance bias	Used	Used	Used	Used	Not used	Used
Largest study with statistically significant effect	Not used	Used ($P < 0.05$)	Not used	Not used	Not used	Not used
2.2 Highly suggestive/class II						
Number of cases	> 1000	> 350	> 1000	No category	≥ 5000	> 1000
P-value	$P < 10^{-6}$	$P < 10^{-6}$	$P < 0.001$	No category	$P \leq 0.001$	$P < 10^{-6}$

Details of criteria	Criteria for credibility assessment of each study					
	Dragioti E, 2017 ⁽⁷³⁾	Dragioti E, 2018 ⁽⁹⁰⁾	Chakranon P, 2019 ⁽¹¹⁴⁾	Kim JY, 2019 ⁽¹²⁰⁾	Dinu M, 2020 ⁽¹³¹⁾	Barbui C, 2020 ⁽¹²⁸⁾
95% prediction interval excluded null	Not Used	Not Used	Not used	No category	Not Used	Used
Heterogeneity	Not Used	Not Used	$I^2 < 50-75\%$	No category	Not considerable heterogeneity ($I^2 = 50-75\%$)	Not Used
No evidence of small-study effects	Not Used	Not Used	Not Used	No category	Not Used	Not Used
No evidence of excess significance bias	Not Used	Not Used	Not Used	No category	Not Used	Not Used
Largest study with statistically significant effect	Not used	Used (P < 0.05)	Not used	No category	Not used	Not used
2.3 Suggestive/class III						
Number of cases	> 1000	> 350	500–1000	Not used	2500–5000	> 1000
P-value	$P \leq 0.001$	$P \geq 10^{-6}$ but $P < 0.001$	$P < 0.001$	$P < 0.005$	$P \leq 0.001$	$P \leq 0.001$
Heterogeneity	Not Used	Not Used	$I^2 > 75\%$	$I^2 < 50\%$	Not Used	Not Used
2.4 Weak/class IV						
P-value	$P \leq 0.05$	$P \leq 0.05$	$P \leq 0.05$	$P \leq 0.05$	$P \leq 0.05$	$P \leq 0.05$
2.5 Non-significant						
P-value	No category	$P > 0.05$	No category	No category	$P > 0.05$	$P > 0.05$

Table 3
Certainty and methodological quality assessment in URs of interventions

Study characteristics	Assessment	P-value
1. Performed a certainty assessment		
Classified by the median of impact factor		
Higher impact journals (IF > 2.74)	21/47 (44.7%)	0.011 ^a
Lower impact journals (IF ≤ 2.74)	10/49 (20.4%)	
Classified by year of publication		
2010–2015	0/11 (0%)	0.015 ^b
2016–2020	31/85 (36.5%)	
2. Performed a methodological quality assessment		
Classified by the median of impact factor		
Higher impact journals (IF > 2.74)	40/47 (85.1%)	0.487 ^a
Lower impact journals (IF ≤ 2.74)	44/49 (89.8%)	
Classified by year of publication		
2010–2015	8/11 (72.7%)	0.138 ^b
2016–2020	76/85 (89.4%)	
^a Chi-square test, ^b Fisher's exact test.		

Among 42 URs of SR-MAs of non-interventions, 30 (71.4%) URs performed certainty of evidence assessments based on some assessment tools, while the rest 12 (28.6%) URs mentioned certainty of the evidence was based on originally reported in the component MAs. Of the 30 URs that assessed certainty of evidence, almost all (N = 28; 93%) utilized the epidemiological credibility assessment tools. These criteria were followed to assess the evidence base in all but one [44] of the 6 articles in the high impact factor group [15, 24, 39, 44, 46, 47]. The rest of the two URs assessed the certainty of evidence using GRADE criteria.

Methodological quality assessment

Almost all of the included URs in the intervention group performed the methodological quality assessment of included MAs (n = 84, 87.5%). Of these, the most frequently used tool was AMSTAR (n = 40, 47.6%), followed by its revised version called AMSTAR 2 (n = 13, 15.5%), and Joanna Bring Institute (JBI) critical appraisal checklist for SRs (n = 6, 7.1%), as shown in Table 1 and Fig. 2. More details of the methodological quality assessment of included MAs, see **Supplement 5–6**.

Twenty-six (61.9%) URs of non-intervention studies have assessed the methodological quality using certain tools, half of which involved AMSTAR while 6 utilized AMSTAR 2, as shown in Table 1. Again, 6 of the URs used critical

appraisal checklist from the JBI. Only one of the URs that assessed methodological quality used Newcastle Ottawa Scale.

Discussion

To the best of our knowledge, this is the first study to identify the methodological approaches for assessing the certainty of evidence in URs of that included SR-MAs. Overall, 138 URs have been included consisting of 96 and 42 URs of interventions and non-interventions, respectively. Only one-third of URs of interventions assessed certainty of evidence, in which the GRADE approach was mainly used. URs published in high JIFs are more likely to assess the certainty of evidence than URs published in low JIFs. About two-third of URs of non-interventions assessed certainty of evidence, in which criteria for credibility was mainly used. Nearly 90% of the URs performed a methodological quality assessment and AMSTAR was the most frequently used tool for this process.

The certainty of the evidence is the extent of confidence to support a decision or recommendation. High certainty in evidence means that the investigators are very confident that the effect they found across studies is close to the true effect and vice versa [147]. Concerning the benefits and harms of a treatment or intervention, the assessment of the certainty of the evidence is essential [148]. Moreover, the certainty of the evidence can be used to develop clinical practice guidelines and recommendations. Again, epidemiological investigations can help establish evidence linking exposure to the incidence of certain health condition in a population. These studies are expected to play a key role in gauging the burden of diseases, delineating guidelines for prevention as well as streamlining the treatment development process. URs of both the interventional and observational studies should aim to provide the highest certainty of evidence to facilitate better health outcomes. Despite the necessity of assessing the certainty of the evidence in URs, there is no consensus that which approach should be the method of choice.

Compared to the results from a previous study by Hartling et al [1] indicating that only 16% of the overview of reviews published between 2000 and 2011 assessed the certainty of the evidence, our study found that only one-third of included URs of interventional studies assessed the certainty of the evidence. Aligned with the previous study [1], the most frequently used method for assessing the certainty of the evidence in the URs was the GRADE approach. One of the reasons could be that the GRADE approach is a well-established tool developed to determine the certainty of evidence-based on several factors namely risk of bias, imprecision, indirectness, inconsistency, and publication bias [147]. However, this tool was primarily designed for assessing the quality of the evidence from primary studies. Thus, further guidance is needed to ensure appropriate use and interpretation of the GRADE tool when it is applied to assess the quality of evidence of SRs, instead of primary studies [1].

Furthermore, this study demonstrated that several methodological approaches for assessing the certainty of evidence were used in the URs. We found that the criteria for credibility assessment, which was recently released [10, 148], was also the second most frequently used method in URs of interventional studies. In contrast, approximately all of the URs of observational studies in our review utilized these epidemiological credibility assessment criteria. The reason that our study differs from the previous study [1, 3] likely because we specifically considered the URs that included MAs. The criteria for credibility assessment classified the certainty of the evidence according to several statistical criteria, which usually reported in MA. However, this approach using the arbitrary cut-off values and the cut point of each component in these criteria varied among previously published URs, reflecting the need for guidance. Although Aromataris et al.—a methodology working group formed by the

JBIC (formerly named the URs Working Group)—published the guidance on how to conduct and report an UR [10], the methodology for the certainty assessment was not provided.

This study demonstrated that a higher number of URs with a certainty assessment were published in higher impact journals and the more recent URs tended to assess the certainty of the evidence. One of the reasons could be that the assessment helped to reflect the certainty of results and facilitate the translation of the evidence into guideline recommendations. Therefore, our findings highlighted the importance of guidance for assessing the certainty of the evidence in URs to recommend the most appropriate tools to provide standards for those conducting URs.

This study also demonstrated that majority of the included URs performed a methodological quality assessment. This was more frequent than a previous study [1] that reported the assessment of methodological quality in only 37% of the overviews of reviews. One of the reasons could be that this process has been strongly recommended in the methodological guidance for producing URs [2] and has been implemented longer than the certainty assessment. This process is essential to ensure that the methodological quality of SR-MAs that included in URs are adequately assessed and incorporated into the results and conclusions. Besides, we found that the most often used tool for methodological quality assessment changed from the Oxman and Guyatt Overview Quality Assessment Questionnaire (OQAQ) to AMSTAR. The AMSTAR tool has been recommended since 2007 and the revised version-AMSTAR 2 was released in 2016. Given that the revised tool introduced recently, the method advocated in published guidance have evolved over time and the variation of tool used for methodological quality assessment reported in this study confirms the need for updated guidance for conducting URs. Furthermore, researchers of URs should incorporate the certainty of evidence and methodological quality assessment and report the results in their URs, which could in turn enable a translation to guideline recommendations or the researchers should otherwise present valid reasons for not assessing it.

Our study has some limitations. First, the definition of included studies was restricted to URs. This might not cover all types of other kinds of reviews for example- overview of reviews, and review of reviews. Therefore, our findings with regards to terminology used to describe “umbrella reviews” and methods used might not be comprehensive or wholly representative. However, there is no universally accepted technical term for this new type of reviews that summarize or synthesize findings from systematic reviews. The term URs has been used increasingly and studies that describe the methodological approach regarding the URs are sparse to date. Second, our study focused on describing the method used in previously published URs and most of them did not provide the reasons for methods selection. Thus, we could not assess the reasons why each UR used different approaches for assessing the certainty of evidence and methodological quality. However, a major strength of our study is that it provides a broad picture of the certainty assessment methods used in URs of both interventional and observational studies. Clearly, authors of URs of observational studies have a preference to use the criteria for credibility assessment tool, while for the URs of experimental studies, the GRADE tool is mostly favored. This highlights an unmet need of a suitable tool to be used in URs of experimental studies. Nevertheless, the reviews of methods used for assessing the certainty of evidence and methodological quality of URs that contained other study designs could be extended in future research.

Conclusions

This study revealed that only one-third of URs that included MAs of experimental designs have assessed the certainty of the evidence in contrast to the majority of the URs of observational studies. While the most frequently used methodological approach for assessing the certainty of the evidence was the GRADE approach in the first group, epidemiological credibility assessment tool was the dominant method in the later. Therefore, guidance and standards are required to ensure the methodological rigor and consistency of certainty of evidence assessment for URs.

Abbreviations

AMSTAR: A Measurement Tool to Assess systematic Reviews; CEBM: Critical appraisal tool for systematic reviews based on Centre for Evidence- Based Medicine; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; IF: impact factors; IQR: Interquartile range; JBI: Joanna Bring Institute; MA: meta-analysis; MQC: Methodological Quality Checklist; NIH: National Institutes of Health; OQAQ: Oxman and Guyatt Overview Quality Assessment Questionnaire; PAGAC: Physical Activity Guidelines Advisory Committee; RCT: randomized controlled trials; ROBIS: A Risk of Bias Assessment Tool for Systematic Reviews; SIGN: Scottish Intercollegiate Guidelines Network; SR: systematic reviews; ICF: International Classification of Functioning; UR: umbrella review

Declarations

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Authors' contributions: SS and NC had the original idea for the study and led the design of the protocol. SS, NP, and SN conducted the literature search and literature screening. SS, KT, NP, SN, and SP extracted data. SS and KT analyzed the data. SS and KT wrote the first draft of the paper. NC supervised the study. NC, NL, AT, SR, and MB reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Figures

Figure 1

Evidence search and selection

Figure 2A Methodological approaches for certainty of evidence assessment

Figure 2B Methodological approaches for methodological quality assessment

Figure 2

Percent used of methodological approaches for certainty and methodological quality assessment

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