Quality assessment of systematic literature on uterine fibroids: a systematic review [version 1; peer review: awaiting peer review]

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Abstract

Background: A systematic literature review (SLR) is a research methodology that examines data and findings of other authors relative to specified research questions (RQ), collects multiple research studies, and summarises them to answer a research question using rigorous methods. Many SLRs have been published on uterine fibroids (UFs) in the last two decades but there is a dearth of knowledge on assessment of the quality to determine the reliability of results.

Methods: This study employed the SLR method to identify available SLRs published on UFs. Dybå and Dingsøyr quality standards and dichotomous grading scales were employed to determine the quality of primary studies. On February 3rd, 2022, an auto search was conducted twice over Citeseer, EBSCO, ACM, Springer Link, IEE Computer society digital library, and Scopus using 17 search strings. Two teams independently screened papers and compared notes with the inclusion/exclusion criteria. 11 criterial were adapted to evaluate the quality of the SLR's.

Results: 33 SLRs were subjected to data extraction after inclusion/exclusion criteria. Answers to our primary research question was positive as the aims and contexts of the SLRs are generally clear and the methodologies employed are all inclusive. The research outputs of the primary studies are valid and justifiable as their research statements were clear and findings unambiguous. Although some studies failed some quality criteria, answers to all RQs were affirmative as the percentage scores of the studies on each of the quality conditions is favourably high.

Conclusions: The auto search may be incomplete because some qualified SLRs may have been missed as the choice of search strings was limited and may have omitted terminologies. Notwithstanding,
with average quality scores of 83% in reporting, 81.2% in rigour, and 79% in credibility, this study concludes that majority of the meta-analysis published so far on UF are valid and reliable.

**Keywords**
Medicine, meta-analysis, Past Studies, Quality Condition, Quality Assessment, Structured Review, Systematic Literature Review; Uterine Fibroids.

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Introduction
Evidenced-based studies started in medicine and became generally accepted as expert opinions based on results obtained from scientific experiments appears more reliable than those obtained from medical advice. Evidence here refers to a combination of best quality scientific works on a topic or research question. A systematic literature review (SLR) is a main method of this synthesis. It is a methodologically rigorous review of research results aimed not just at aggregating all existing evidence on a research question but also targeted at supporting the development of evidence-based guidelines for practitioners. Its use in software engineering and computer sciences subject areas, and its application has been increasing since 2004 as it considers findings from varying sources to form a position. Notwithstanding this popularity, the quality of the SLRs’ results should be assessed to determine both the level of confidence to be placed on them as well as the required recommendations to offer.

As an instance, we have two schools of thought regarding gynaecological conditions in pregnancy. Myomectomy during cesarean section (CS) was condemned for severe bleeding and potential hysterectomy. Whereas, there are advocates for myomectomy at sittings of surgery three to six months after delivery to promote uterus involution, myomas shrinkage, and reduce operative time and blood loss. Nowadays, gynaecologists are advocating for the removal of myoma due to its minimal operative time, mild (or no) complications to call for a second surgery, and gross reduction in the total cost of myomas surgery. Systematic literatures have reviewed the perioperative complications of caesarean myomectomy (CM) and found increased operative time and drop in haemoglobin in cases of caesarean myomectomy. in their Evidenced-based reviews, Arowolo et al.,2 also argued that Uterine artery embolization advantages over surgery is short-term and that the benefits were similar on the mid- and long-term. However, the qualities of these studies have not been evaluated to raise the confidence in their findings and reduce bias in their review process for better interpretation of results.

Primary studies assessment can actually be complicated since there is no specific definition for “quality”. However, some notable researchers such as Jadad et al.,1 Dybå and Dingsøyr,2 Kitchenham et al.,3 and Sjoberg et al.,4 have successfully developed guidelines and tools specifically meant for the purpose, but much more concerned about what the results are, their validity, and whether or not they will be locally useful. Since the “quality of a study is closely linked to the research methods used and the validity of the findings generated by the study”,5 this study comprehensively reviewed the quality of the past available related studies published by evaluating various methods used by primary studies of each of the selected SLRs to clearly established the validity of their results. Hence, the authors did not place a date or year bound/limit on the search engine in other to have a sizeable number of primary studies to work with having realized that not much SLRs has been done on leiomyomas or myomas to date – February 3rd, 2022.

Past related works
Quality is regarded as “an extent to which systematic errors or bias may be prevented through the review and analysis of primary studies”.6 Yet, researchers are less interested in quality assurance and assessment as only very small numbers of SLRs aimed at the quality assessment of their primary studies.

Orlando et al.,13 employed the National Institutes of Health Study Quality Assessment tools to perform quality assessment of SLR towards identifying the identifying best practices for non-hysteroscopic myomectomy for women with myomas but still desire future fertility. Their initial searches on selected databases returned 2,163 studies out of which only 51 met their inclusion criteria. The authors noted that the route of non-hysteroscopy myomectomy and intraoperative uterine artery occlusion did not significantly affect pregnancy rates or outcomes. Giving a clear insight into patient selection and intraoperative techniques for non-hysteroscopic myomectomy, the study recommended further research with well-designed clinical trials to highlight the relationships between myoma characteristics and reproductive outcomes.

Notwithstanding its high prevalence, the fibroids psychosocial impact was yet to be compared with other chronic conditions and evaluated across the quality-of-life indicators. Hence, Go, Virginia et al.,14 thoroughly appraised the available evidence against the UF psychosocial burden in premenopausal women and contrasted the quality of life validated and symptom scores before and after treatment. The authors engaged three independent reviewers to screen various abstracts and tiles of selected SLRs towards obtaining full text studies from notable databases for further assessment. They observed that quality-of-life scores in UF patients were usually low at baseline compared to after treatment and that, there are therapeutic success and improvement of both physical and emotional symptoms after treatment.

Tranoulis, Anastasios15 auto-searched some digital libraries and broad indexes to produce the first meta-analysis that could provide a convincing overview of efficacy and safety of laparoscopic uterine artery occlusion (LUAO). Comparing
the long and short-term morbidity of laparoscopic myomectomy (even without LUAO), the study modified the Jadad score to assess the quality of Randomized controlled trials (RCTs) but employed methodologic index for nonrandomized studies to evaluate the quality of observational studies (OSs).

symptomatic uterine myomas, two independent researchers in Liu, Lu16 carried out data selection to perform a comparative study of the clinical outcomes of uterine artery embolization and those of high-intensity focused ultrasound (HIFU) ablation in women with myomas. The study quality was assessed using the “Cochrane Handbook for Systematic Reviews” while the pooled mean difference and relative risks were both calculated at 95% confidence interval for the respective continuous data and dichotomous data. Although, the authors could not ascertain that HIFU is far better for desired pregnancy considering the confounding factors, they postulated that uterine artery embolization (UAE) lowers both postoperative re-intervention rate and pregnancy rate for women with uterine myomas and provide more significant alleviation of symptoms and improvement in quality of life.

Methods
Researchers have built several guidelines and checklist good enough for quality assessment in SLR. While majority of these tools rally round the validity of the research outcomes, a few others look more at the methodological characteristics of the study. Jadad et al., 7 and CASP17 are popular tools and commonly adapted in Sociology and Software Engineering18 but their scales are not directly applicable to Medicine. Hence, following the raising of the study questions and review of past related studies, Dybå and Dingsøyr8 11 criterial were adapted in this study to evaluate the quality of the SLR’s primary studies. In which case, each of these criteria, graded with a dichotomous scale (Yes=1; No=0), is categorized into the following four main issues for ease of quality assessments.

- **Reporting**: Criteria (1, 2, and 3) are about the quality of the report of research aims, rationale, and context.
- **Rigor**: Criteria (4, 5, 6, 7, and 8) have to do with the objectivity of the research methods used to establish the validity of data collection tools and the analysis methods, and hence the trustworthiness of the findings.
- **Credibility**: Criteria (9 and 10) are connected directly to assess the credibility of the research methods to ensure the validity of the findings.
- **Relevance**: Criterion 11 is concerned with the relevance of the study to the research community at large.

The questions
The primary research question (RQ) is “How reliable are the meta-analysis in the Uterine Fibroids”?

This question is broken down into the following secondary questions to address the study objectives

- **RQ1**: Are the SLRs studies centred on clear aims and description of context?
- **RQ2**: How inclusive are the methodologies employed in the primary studies?
- **RQ3**: Are the study output valid?

The search process
We conducted three independent searches on February 3rd and 4th 2022, and all were without publication date restriction. Our initial auto searches of five notable digital libraries and broad indexes for relevant SLRs (Citeseer, EBSCO, ACM, Springer Link, IIE Computer society digital library) did not return much related studies. Our second Search was over Scopus and returned 153 studies fleshed SLRs but PowerPoint templates or lecture notes. This search was complicated as it was done 17 times using the underlisted set of search strings (SS) since Scopus does not allow very simple construction of complex searches:

1. “Fibroid OR leiomyomas OR myomas” AND “review of studies”
2. “Fibroid OR leiomyomas OR myomas” AND “structured review”
3. “Fibroid OR leiomyomas OR myomas” AND “systematic review”
4. “Fibroid OR leiomyomas OR myomas” AND “literature review”
5. “Fibroid OR leiomyomas OR myomas” AND “literature analysis”
6. “Fibroid OR leiomyomas OR myomas” AND “in-depth survey”
7. “Fibroid OR leiomyomas OR myomas” AND “literature survey”
8. “Fibroid OR leiomyomas OR myomas” AND “meta-analysis”
9. “Fibroid OR leiomyomas OR myomas” AND “past studies”
10. “Fibroid OR leiomyomas OR myomas” AND “subject matter expert”
11. “Fibroid OR leiomyomas OR myomas” AND “Analysis of research”
12. “Fibroid OR leiomyomas OR myomas” AND “empirical body of knowledge”
13. “Fibroid OR leiomyomas OR myomas” AND “overview of existing knowledge”
14. “Fibroid OR leiomyomas OR myomas” AND “body of published research”
15. “Fibroid OR leiomyomas OR myomas” AND “review”
16. “Fibroid OR leiomyomas OR myomas” AND “literature analysis”
17. “Fibroid OR leiomyomas OR myomas” AND “literature listing”

However, our third search, which was limited to the source - “Science Direct” only, was simple and straightforward as the underlisted complex searches were applied only once using the independent search strings SS1 and SS2 in isolation:

SS1 Title, abstract or author-specified keywords
(leiomyomas OR myomas) AND (“literature review” OR “systematic review” OR “structured review” OR “review of study” OR “literature analysis” OR “in-depth survey” OR “literature survey”)

SS2 Title, abstract or author-specified keywords
(leiomyomas OR myomas) AND (“meta-analysis” OR “past studies” OR “subject matter expert” OR “Analysis of research” OR “empirical body of knowledge” OR “overview of existing knowledge” OR “body of published research”)

Having noted that not many SLRs are available on Fibroid studies, all searches were conducted without publication date restrictions. However, the searches were limited to document title and keywords, which usually carry the research subjects. To avoid human error, two researchers were engaged to independently conduct the literature search, and their results were compared for completeness. Searches over Scopus are mainly not fully fleshed out but they are still relevant to this study as their output helps to validate our search process when compared with papers found in our last search. Since 96 of 98 fully fleshed SLRs found therein were part of the total SLRs found in the third search, we adjudge our search process and procedure to be okay and accurate.

**Study selection**
The results of the three searches were integrated together to have 169 papers in total which we eventually subjected to initial screening over their title, abstract, and keywords. Sorting on the document title, the total papers was reduced to 65 having removed 104 articles including the 98 SLRs found in Scopus to avoid duplication since they are also found in Science Direct (our third search). We assume that the abstract or title of any quality papers should contain at least one of the search strings. Hence, searching over both the title and abstract columns to exclude papers that have no abstract” or those that exclude literature review or any of the search strings (SS), another 12 articles were removed and the total SLRs were further reduced to 53, all of which were subsequently subjected to a more detailed assessment:
These 53 SLRs were electronically downloaded and two teams of two members each were formed to screen the papers for possible exclusion or inclusion. Consequently, the teams compared their notes to prevent false acceptance or false rejection, and differences were addressed following the underlisted exclusion criteria:

- The SLR is not fully fleshed but a mere research or lesson note.
- The topic is medicine or surgery and not related to Fibroid nor discusses systematic/literature reviews.
- The SLR followed a vague search process.

Three papers\textsuperscript{6,20,21} were rejected in this process for not being full-fleshed research publications, but a mere research/lesson note or PowerPoint template. 15 SLRs were excluded based on unrelated topics or failure to discuss systematic literature but dissimilar domains like surgery or Microbiology. Similarly, two other papers\textsuperscript{22,23} did not follow a defined search process and were dropped to have just 33 SLRs subjected to data extraction (Figure 1).

Data extraction process
A similar procedure to data selection was followed to extract data and identified the SRSs presented on Table 1. As a quality assurance measure, the following parameters were identified for each of the selected papers:

- The publication date/year (to show how current the SLRs)
- The type of the document (journal, workshop, book chapter, conference).
- The number of primary studies in the SLR (as stated by the author).
- The aspects of UF studied

Quality assessment
This study employed the Dybå and Dingsøyr\textsuperscript{7} criteria to evaluate the quality of the selected SLRs.\textsuperscript{24,25} The choice of this set of criteria was because it contains 11 criteria checklists (as against others with fewer criteria) and covers all the main aspects of any research quality – reporting, credibility, relevance, and rigor. Adapted to this work, the selected SLRs are therefore independently assessed with the following criteria:

Q1 Does the study answer the research questions defined or presents the results in a clear way?

Q2: Is the research aim clearly stated?

![Figure 1. The study selection flow diagram.](image)
### Table 1. Quality scores for the 33 systematic literature reviews (SLRs).

| Study No | Year | Document Type | No of 1st studies | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 |
|----------|------|---------------|-------------------|----|----|----|----|----|----|----|----|----|-----|-----|
| 26       | 2020 | Journal article | 408               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 0   | 1   |
| 27       | 2015 | Journal article | 15                | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 1  | 0   | 1   |
| 28       | 2019 | Journal article | 2351              | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 1   |     |
| 29       | 2014 | Journal article | 645               | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 1   |     |
| 30       | 2018 | Journal article | 2016              | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |     |
| 31       | 2015 | Journal article | 345               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |     |
| 32       | 2017 | Journal article | 986               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   |     |
| 33       | 2016 | Journal article | 122               | 1  | 1  | 0  | 0  | 1  | 1  | 1  | 1  | 0   | 1   |
| 34       | 2010 | Journal article | 17                | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0   | 0   | 1   |
| 35       | 2012 | Journal article | 85                | 1  | 0  | 1  | 0  | 0  | 1  | 1  | 1   | 1   |     |
| 36       | 2014 | Journal article | 99                | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 0   | 1   |
| 37       | 2018 | Journal article | 18                | 1  | 1  | 1  | 0  | 0  | 1  | 1  | 1   | 1   |     |
| 38       | 2012 | Journal article | 5                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |     |
| 39       | 2014 | Journal article | 676               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| 40       | 2017 | Journal article | 5347              | 0  | 1  | 0  | 0  | 1  | 1  | 1  | 1   | 0   | 1   |
| 41       | 2016 | Journal article | 756               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |     |
| 42       | 2018 | Journal article | 907               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| 43       | 2015 | Journal article | 3                 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| 44       | 2020 | Journal article | 57                | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| 45       | 2019 | Journal article | 249               | 1  | 0  | 1  | 0  | 0  | 1  | 1  | 1   | 0   | 1   |
| 46       | 2010 | Journal article | 25                | 0  | 0  | 0  | 0  | 0  | 1  | 1  | 0   | 0   | 1   |
| 47       | 2015 | Journal article | 194               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| 48       | 2016 | Journal article | 934               | 1  | 1  | 0  | 0  | 0  | 1  | 1  | 1   | 1   | 1   |
| 49       | 2019 | Journal article | 26                | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |     |
| 50       | 2019 | Journal article | 568               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |
| Study No | Year | Document Type | No of 1st studies | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 |
|----------|------|---------------|------------------|----|----|----|----|----|----|----|----|----|-----|-----|
| 15       | 2018 | Journal article | 12               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |
| 51       | 2017 | Journal article | 12               | 0  | 1  | 0  | 0  | 1  | 1  | 1  | 0  | 0   | 1   |
| 52       | 2015 | Journal article | 3975             | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |
| 35       | 2012 | Journal article | 85               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |
| 53       | 2018 | Journal article | 90               | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |
| 54       | 2010 | Journal article | 196              | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1   | 1   |
| **TOTAL**|      |                |                  | 27 | 28 | 27 | 22 | 23 | 23 | 23 | 26 | 26 | 26  | 33  |
Q3: Is the context where the study was conducted adequately described?

Q4: Was the study appropriately designed to address its aims and objectives?

Q5: Was the recruitment strategy to drive the research aim appropriate?

Q6: Were there control group(s) to compare with the treatments?

Q7: Was the data collection method good enough to address research issues?

Q8: Was the data analysis necessarily difficult?

Q9: Has the relationship between researcher and participants been adequately considered?

Q10: Is the statement of findings clearly stated?

Q11: Is the research valuable to practice or research interest?

A dichotomous scale was used to score and grade the questions. In which case:

$$\text{TRUE} (T) = 1; \text{FALSE} (F) = 0.$$

Our quality assessment procedure is like the one used for data selection (Figure 1) where:

1. Two teams of two researchers each are formed and all the SLRs were individually assessed by each team.

2. Each team member independent treated each study by answering the quality questions, giving adequate justification.

3. The pair researchers compared their notes and agreed on terms to finalize their team results.

4. To avoid human error, two teams of researchers were engaged to independently conduct the literature search. They placed their findings side-by-side to compare their results, settle disputes (if any), and produce a quality output as presented on Table 1.

**Results**

Our research questions are addressed on this section to ensure that they have all been answered and the SLRs’ qualities have been established. The results of the SLRs’ quality assessment are summarised on Table 2. The pass mark is fixed at 50%.

| SLRs | Quality scores (QS) | % Scores (QS/33) | Research question (RQ) addressed | Related Quality Conditions (QC) | QC Met? |
|------|---------------------|------------------|----------------------------------|---------------------------------|---------|
| Q1   | 27                  | 82               | RQ1                              | Reporting                       | Yes, by 83% |
| Q2   | 28                  | 85               |                                  |                                 |         |
| Q3   | 27                  | 82               |                                  |                                 |         |
| Q4   | 22                  | 67               | RQ2                              | Rigour                          | Yes, by 81.2% |
| Q5   | 23                  | 70               |                                  |                                 |         |
| Q6   | 23                  | 70               |                                  |                                 |         |
| Q7   | 33                  | 100              | RQ3                              | Credibility                     | Yes, by 79% |
| Q8   | 33                  | 100              |                                  |                                 |         |
| Q9   | 26                  | 79               |                                  |                                 |         |
| Q10  | 26                  | 79               |                                  |                                 |         |
| Q11  | 33                  | 100              | Nil                              | Relevance                       |         |
RQ1: Are the SLRs studies centred on Clear Aims and Description of Context?
The answer to the RQ1 is positive as evidenced on Table 2 where the average score of Q1, Q2, and Q3 which particularly address RQ1 is 83% affirmative. Although five studies failed on Q2 and six failed on both Q1 and Q3 each, the percentage Scores of each on the quality condition (reporting) is favourably high. The failure on Q1 is traced to the five articles that properly addressed their research questions but failed to make their results/findings clear enough. Other failures were due to the articles that did not have clear research goals and those with obscure research contexts. Majority of the study representing 83% of the total samples, subjectively elucidated the (research) participants actions and made use of qualitative approaches, which is the most appropriate to address their study goals.

RQ2: How inclusive are the methodologies employed in the primary studies?
Yes, Most of the primary studies employed complete and all-encompassing research methodologies going by their QC score of 81% in “Rigour” on Table 2. This answer to RQ2 is determined by the status of “rigour”, which is an absolute function of the average scores of Q4, Q5, Q6, and Q8.

Although 10 of the 33 primary studies did not employ appropriate recruitment strategies for their studies, and the research objectives of 11 are inappropriately designed. Exactly 10 are also silent on the control group(s) required to compare their research methods. However, all of them gave extensive description of their analysis processes and present sufficient data to support their findings (Q7 and Q8); they were simple in data collection and detailed in sample analysis.

RQ3: Are the study output valid and justifiable?
Yes, the research outputs of the primary studies are valid and justifiable considering the 79% QC score on the research “credibility” even though, some of them truly failed on Q10 as their research statements were unclear and finding ambiguous. Some researchers did not actually consider their influence in their research questions formulation, sample collection and even their choice of location (Q9), but this is limited to only five primary studies where the researchers disclosed their possibilities of being biased. Hence, adequate recognition was given to the relationship between the researcher and the participants.

Study limitations
We may have missed some qualified studies that used other terminologies to describe their literature review. Notwithstanding, this cannot be major as our search strings did not leave out any related terminologies found in every literature reviewed except “research aggregation” and “study/research synthesis” which we stumbled on at the tail end of this study. Future researchers should take notes of these terminologies to avoid omission of qualified SLRs for review.

Conclusion
All the SLRs passed all the quality questions (Table 2) with the lowest in Q4. They also met and greatly surpassed all the quality conditions (QC) to clearly confirm that the primary studies are valid and of good quality. Therefore, answer to our primary (RQ) raised is affirmative; the meta-analysis in the Uterine Fibroids are very reliable. However, the SLRs needed to appropriately design their studies to be specific on their goals and objectives. They should also be explicit on the control groups with which their treatments and research methods are compared.

It is important for auto search to be complete and error free for reliable outputs and valid findings. When planning future studies therefore, the researchers should extend their search strings to include other terminologies that may have been missed in this study.

Data availability
All data underlying the results are available as part of the article and no additional source data are required.

Reporting guidelines
Figshare: PRISMA checklist for ‘Quality assessment of systematic literatures on uterine fibroids: a systematic review’, https://doi.org/10.6084/m9.figshare.20654010.v1.

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

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