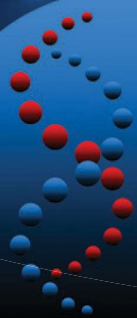


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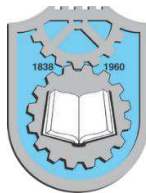
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SEARCH PROCEDURE AND DATA EXTRACTION FOR META-ANALYSIS IN BIOMEDICAL RESEARCH

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Abstract:

The meta-analysis provides a unique scientific conclusion with precise statistical analysis of pooled data extracted from previously reported relevant studies. That gives a better insight into the current issue with more statistical certainty than any single study observation in biomedical research. Occasionally, meta-analyses don't provide a precise time for each step of the search strategy. The complete meta-analysis procedure is usually time-consuming, with 6-18 months reported, but it depends on the numbers of collected articles manually reviewed by two or more researchers to prevent potential bias. The purpose of this paper was to present a part of meta-analysis research with a focus on a timeline manner for extraction procedure and suggestions for preparing the database of collected articles. PRISMA guidelines were followed, and Pub Med, Scopus, and ISI Web of Science for the search were used. EndNote reference manager v.7 and Microsoft Excel 2007 were used for base preparation. Results showed that the final reference number was 4918, and 99.88% of them were excluded. A month was necessary for the search of the electronic databases. For reading titles and abstracts and extracting the papers was needed the fourth month. A month was needed for an additional search of bibliographies of the eligible papers. Even with the dedication of the team of reviewers, it is hard to predict the exact time for conducting the meta-analysis, indeed. Our results could be applicable in planning the potential systematic reviews, with or without meta-analysis, and overcoming the obstacles in the single database preparation.

Key words: Meta analysis, Systematic review, Biomedical Research

1. Introduction

Narrative reviews are usually subjective interpretations of available literature, and besides the high quality, might have a considerable certainty of conclusions. On the other side, a meta-analysis has powerful statistical tools for examining particular research results, the heterogeneity of the studies, or the potential bias [1-4]. Meta-analyses usually miss the detailed explanation for the preparation of a unique base of papers to be selected according to a specific scientific question, as well as the extraction procedure. A small number of studies reported the exact time for conducting the systematic review with meta-analysis [5-8]. This paper was addressed to users from the biomedical field for overcoming obstacles at the beginning of data preparation for conducting meta-analysis. We provided here approximate time for database preparation with brief instructions for overcoming the potential obstacles based on past experience [9, 10]

2. Methods

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used for our meta-analysis [11]. The three electronic databases, Pub Med, Scopus, and ISI Web of Science were used for the selection of published papers, according to predefined inclusion and exclusion criteria. Statistical analyses were performed with STATA software package v.15 (Stata Corp., College Station, TX). EndNote reference manager ver.7 and Microsoft Excel 2007 were used for the preparation of the base of papers.

3. Results

The searched results from publically available databases Pub Med, WOS, Scopus were inserted in EndNote reference manager, and after that, exported to Excel, by creating the database for a selection

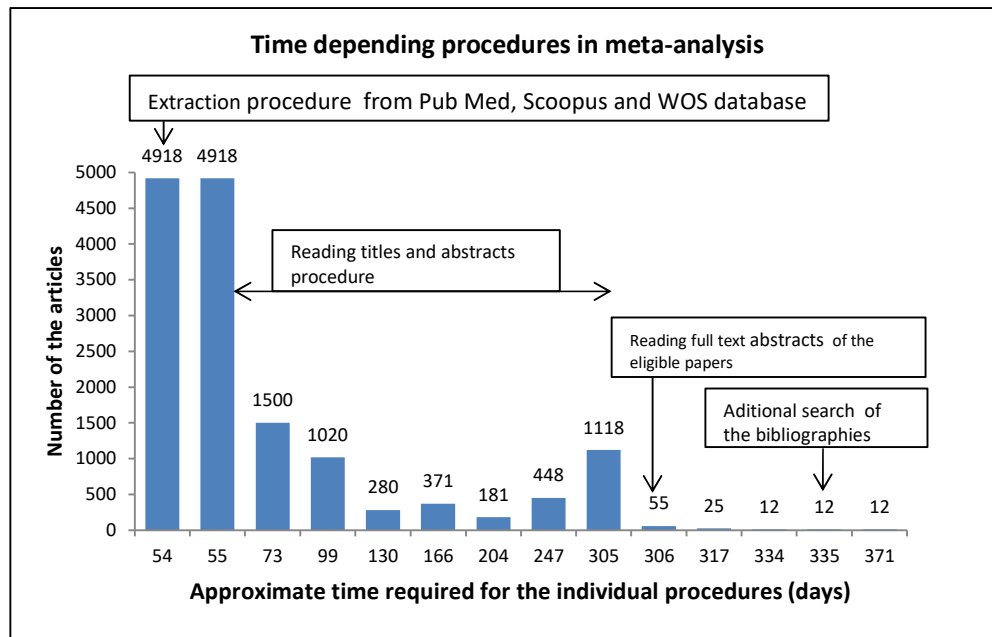


Fig. 1. Time depending procedures in meta-analysis.

of the eligible studies. But every single step of that procedure had certain obstacles that we detected here and overcame. In the meta-analysis that we recently performed, the final reference number of papers to be extracted was 4918. Percent of the articles extracted firstly was 99.76%, with the final 99.88% excluded articles. Based on Figure 1 provided by a single reviewer (J.O.) approximately two months were needed for the search of three electronic databases Pub Med, WOS, Scopus, and creating a base of papers. Three months were needed for reading titles and abstracts and selection of the eligible papers, and a month for an additional search of bibliographies of the eligible selected papers (precise dates are available upon request).

4. Discussion

Traditional reviews lack statistical certainty, and have a high level of bias, on the other side meta-analysis has the potential to examine not just the scientific hypothesis, but to statistically examine the heterogeneity of the eligible included studies and potential bias in them [5, 12]. Good practice in this type of research is to follow clear PRISMA guidelines [6, 11]. It has precise checklist items with a clear presentation in the flow diagram of the study identification, screening, full-text articles assessed for

eligibility, full-text articles excluded, with reasons, and the included studies in qualitative, and quantitative-meta-analysis. That enhances transparency, certainty, quality of systematic review reporting [6, 11, 13]. Six to eight months is reported as the time to perform a complete systematic review by a team of reviewers, according to the Cochrane Collaboration. The others are more realistic and reported the 18 months for this process, but this is strongly connected to the available numbers of papers to read and the competence of reviewers to accurately manage the whole research [5-7, 13]. Since the time for the process of preparation of the data in most meta-analysis papers lacks [8, 14, 15], particularly the technical details in managing the selected papers, creating the datasheet, and extraction procedure. Concise instructions were present in this paper based on insight into our previous reports [9, 10]. For the accurate search performed, a careful examination of the instructions of particular database search criteria is needed. Each database individually has specific rules to be followed for the search query (Pub Med, WOS, Scopus, GWAS, etc.). Once settled, a search query for the Pub Med search might be adjusted for the other databases according to their recommendations. A Pub Med search was performed, and the search result was exported to EndNote, but exporting that EndNote library to Excel was challenging. The recommendation is to set a new output style. For ISI WOS use, one needs to be logged in by the Kobson portal (for researchers from Serbia), or a similar portal of a particular country. For Scopus usage in meta-analysis search, one needs to be logged in and to be a registrant. It provides only 2000 references to be imported in EndNote. If there are more than 2000, it is exported as a .csv (comma-separated values) file to be imported into the Excel document. For the importation of that file, a text wizard in Excel needs to be used. After all the adjustments, the search result was imported to EndNote, but unfortunately, it didn't provide abstracts. For the EndNote version 7, manually were updated all the abstracts because of the lack of appropriate commands. EndNote version 8 and higher has this process automatic. It can be time-consuming. There is an automatic option to remove the duplicates in Excel and EndNote, and even performed, still references needed to be inspected and manually removed the duplicates. It also can be time-consuming since all of those processes are performed manually.

5. Conclusion

Application of the meta-analysis findings in biomedical research might be for fundamental researchers and health care professionals. The aim is to update knowledge, to improve therapy making decisions, or for funding agencies that support particular research, etc. So the systematic research with or without meta-analysis must have a rigorous statistical methodology for accurate and clear reporting of the evidence. Even with the true dedication of the team of reviewers, it is not possible to predict the exact time for each part of the process of collecting and extracting the data. These short instructions, and reported approximate time for each of the processes of collecting the papers, inserting in the unique database, extraction procedure, and examination of the eligibility, could improve future planning and conducting the potential systematic reviews.

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