

Are Systematic Reviews and Meta-analysis on the Verge of Extinction with the Advent of Artificial intelligence?

Prannoy Paul¹, Ashok Shyam^{2,3}, Sujit Jos¹

Learning Point of the Article:

Artificial intelligence may soon replace the traditional methods of systematic review and meta-analysis in generating evidence from medical literature.

Abstract

Conventionally, systematic reviews and meta-analysis constituted the highest level of evidence from medical research. With the introduction of artificial intelligence (AI), rapid analysis of large amounts of medical data and synthesis of useful results are possible in a fraction of the time taken for systemic reviews and meta-analysis by humans. However, it is not without drawbacks. This article discusses the implications of AI in the future of systematic reviews and meta-analysis in the medical literature.

Keywords: Artificial intelligence, systematic reviews, meta analysis, orthopedics.

Introduction

Articles published in the medical literature have grown exponentially in the recent years. For instance, there has been a five-fold increase in annual publications in the PubMed database from 2007 to 2021 [1]. Medical field generates the highest number of publications every year, compared to other scientific fields [2]. It is practically impossible to read all the published data on a particular topic to gather scientific evidence. This is where the role of systematic reviews comes in. Systematic reviews analyze previously published medical data to generate summaries for evidence, in a transparent and reproducible manner. Hence, conclusions drawn from systematic reviews are considered the highest level of evidence in medical research [3]. Systematic reviews are thus very crucial to science as well as policy and decision-making. The downside is that systematic reviews are highly time-consuming and labor-intensive, requiring the review of a large number of articles, critical

appraisal of their quality, and pooling the statistical data to generate meaningful results. Hence, it is often noted that it may take months or sometimes years for systematic reviews to be completed. Furthermore, when data regarding a particular topic is limited, systematic reviews and meta-analysis combines studies with small sample sizes to synthesize interpretations and evidence. This is particularly important in areas where available studies are limited or the sample size is less. The process of systematic review and meta-analysis involves an exhaustive search of the literature, statistical pooling of the available data, and critical evaluation of the studies. However, with the introduction of artificial intelligence (AI), which can compile large amounts of medical data from multiple sources and provide meaningful interpretations, the use of these traditional methodologies of systematic review and meta-analysis might soon be obsolete or at the very least, significantly be transformed in the execution of such analysis [4].

Author's Photo Gallery



Dr. Prannoy Paul



Dr. Ashok Shyam



Dr. Sujit Jos

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¹Department of Orthopedics, Institute of Advanced Orthopedics, M.O.S.C Medical College Kolenchery, Kochi, Kerala, India,
²Indian Orthopaedic Research Group, Thane, Maharashtra, India,
³Department of Orthopaedics, Sancheti Institute for Orthopaedics and Rehabilitation, Pune, Maharashtra, India.

Address of Correspondence:

Dr. Prannoy Paul,
Department of Orthopedics, Institute of Advanced Orthopaedics, M.O.S.C Medical College Hospital, Kolenchery, Ernakulam, Kerala, India.
E-mail: prannoy paul@gmail.com

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AI offers various advantages over traditional human-based systematic reviews. First is the ability of AI to process very vast amount of medical data at unprecedented speeds. Traditional methods of systematic reviews and meta-analysis are often time-consuming. Some reviews take months or even years to be completed. AI, on the other hand, can rapidly analyze thousands of studies, identify the data points, and make note of minor relationships that may be missed by human counterparts. An example is the systematic review that screened over 60,000 articles to produce a meaningful inference [5]. Such studies could never have taken place without the use of AI. AI can do all this in a fraction of the time taken by humans. In surgical fields, such speed and efficacy in identifying the latest evidence can make a huge difference in surgical outcomes. AS review is a commonly used AI tool introduced in 2021 that relies on machine learning for conducting systematic reviews [6].

Another advantage of AI is that it can overcome the biases and limitations that influence human reviewers. Human reviewers, despite their best efforts, are often prone to errors in judgment and cognitive biases. AI can provide an objective approach to synthesize evidence from studies. AI can also standardize the data extraction and study quality, thereby reducing the variability found in human systematic reviews. Further, AI can learn and evolve with time, improving the accuracy and reliability. Large systematic review institutions like Cochrane and PRISMA might soon adopt AI into their systematic reviews.

That being said, generating evidence with AI is not without challenges. Ensuring the reproducibility of analysis driven by AI is crucial in maintaining the reliability of the results generated by AI [7]. Furthermore, data privacy and bias in algorithms add to the ethical implications of AI. AI algorithms also tend to make predictions based on the data they are trained on. This can lead to a risk of bias if the same data is fed to AI repeatedly. As AI-generated content has increased in the literature, AI that depends on AI-generated content for analysis may produce wrong results [8]. There is an urgent need to formulate globally recognized guidelines on the use of AI tools in conducting systematic reviews. This will enable transparency and uniformity in the generated results. Only then will the results generated from AI-generated systematic reviews be of actual value.

Despite the limitations and challenges, the potential of AI in revolutionizing research cannot be ignored. Conventional systematic reviews and meta-analysis provide the highest level of evidence which is integral to the medical field. We must learn to learn and adapt to the new era of AI, while understanding the limitations. AI-driven technologies will soon complement or replace the traditional systematic reviews and meta-analysis.

Clinical Message

AI may soon replace the traditional methods of systematic review and meta-analysis. The role of AI in revolutionizing medical research is inevitable, but not without risks.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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