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Analysis of Retracted Publications in Medical Literature Due to Ethical Violations

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ABSTRACT

Background: Retraction is an essential procedure for correcting scientific literature and informing readers about articles containing significant errors or omissions. Ethical violations are one of the significant triggers of the retraction process. The objective of this study was to evaluate the characteristics of retracted articles in the medical literature due to ethical violations.

Methods: The Retraction Watch Database was utilized for this descriptive study. The 'ethical violations' and 'medicine' options were chosen. The date range was 2010 to 2023. The collected data included the number of authors, the date of publication and retraction, the journal of publication, the indexing status of the journal, the country of the corresponding author, the subject area of the article, and the particular retraction reasons.

Results: A total of 177 articles were analyzed. The most retractions were detected in 2019 (n = 29) and 2012 (n = 28). The median time period between the articles' first publication date and the date of retraction was 647 (0–4,295) days. The leading countries were China (n = 47), USA (n = 25), South Korea (n = 23), Iran (n = 14), and India (n = 12). The main causes of retraction were ethical approval issues (n = 65), data-related concerns (n = 51), informed consent issues (n = 45), and fake-biased peer review (n = 30).

Conclusion: Unethical behavior is one of the most significant obstacles to scientific advancement. Obtaining appropriate ethics committee approvals and informed consent forms is crucial in ensuring the ethical conduct of medical research. It is the responsibility of journal editors to ensure that raw data is controlled and peer review processes are conducted effectively. It is essential to educate young researchers on unethical practices and the negative outcomes that may result from them.

Keywords: Article; Ethics; Medicine; Peer Review; Plagiarism; Publishing; Retraction of Publication as Topic; Scientific Misconduct

Authors Contributions

Conceptualization: Kocyigit BF, Akyol A, Zhaksylyk A, Seil B, Yessirkepov M. Data curation: Kocyigit BF, Akyol A, Zhaksylyk A, Seil B, Yessirkepov M. Formal analysis: Kocyigit BF. Investigation: Kocyigit BF, Akyol A. Methodology: Kocyigit BF, Akyol A, Zhaksylyk A, Seil B, Yessirkepov M. Software: Kocyigit BF. Visualization: Kocyigit BF. Writing - original draft: Kocyigit BF, Akyol A, Zhaksylyk A, Seil B, Yessirkepov M. Writing - review & editing: Kocyigit BF, Akyol A, Zhaksylyk A, Seil B, Yessirkepov M.

INTRODUCTION

Scientific research involves a rigorous methodology that includes developing hypotheses, designing and conducting studies, presenting, documenting, and interpreting results. It is a systematic process that requires careful planning and attention to detail to ensure the findings' validity and reliability.^{1,2} Actions or interventions that are recognized to impede or undermine one or more of these crucial steps are deemed as research misconduct.³ When a paper in the scientific literature is discovered to have significant flaws, retraction is the appropriate step to ensure that inaccurate or biased data do not mislead readers. Retraction is a process that corrects scientific literature and informs readers about publications that contain significant errors or omissions. The inaccurate data may be due to an unintentional mistake or scientific misconduct.⁴⁻⁶

The retraction reasons can be diverse. Over the years, the number of retracted publications has increased, but the causes of this trend remain unclear. It is uncertain whether this rise is due to a decrease in the scientific community's integrity, the enhanced visibility and availability of published articles, or advancements in software and statistical techniques. Nonetheless, erroneous conclusions in the medical literature can perpetuate flawed research and result in the mismanagement of patients, leading to harmful consequences.⁷⁻⁹

The retraction notes need to be informative, clear, and concise about the entity retracting the article and should avoid making defamatory statements. A balanced approach should be maintained while providing adequate information about the retraction. In addition, the retraction notes should be easily accessible and understandable.¹⁰

Ethical violations are a significant concern in the context of article retractions. Therefore, we conducted a study using the Retraction Watch Database. Our first aim is to assess the distribution of retracted articles due to ethical violations in the medical literature between 2010 and 2023. The secondary aims are to identify the journals and countries with the highest number of retracted articles in this category and to analyze the subject areas of the retracted articles. Additionally, we seek to provide comprehensive information on the retraction reasons in the identified publications.

METHODS

The Retraction Watch Database (<http://retractiondatabase.org/RetractionSearch.aspx?>) was utilized for this descriptive study to obtain data. The database provides 'Ethical Violations by Author' and 'Ethical Violations by Third Party' options under the reasons for retraction heading. To create a more comprehensive listing, the phrase 'Ethical Violations' was manually entered in the section under Reasons for Retraction. There are 32 medicine-related subcategories in the subject(s) category, beginning with 'Medicine-Alternative' and ending with 'Medicine-Urology/Nephrology.' To list the data relevant to all of these categories, 'Medicine' was entered manually in the subject (s) category. January 1, 2010, was set as the starting date. The last data update was made on April 25, 2023.

Extraction of data

The retracted papers' bibliographic data were copied to an Excel file and documented. The collected data consists of various details related to the retracted publications, such as the

title of the article, the number of authors, the date of publication and retraction, the journal of publication, indexing status in PubMed, MEDLINE, Web of Science Core Collection, and Scopus, the country of the corresponding author, subject area of the paper, and the specific reasons for retraction.

Categorization of retraction notes

The categorization was designed in the following manner^{11,12}:

- Date-related concerns (concerns about the accuracy or validity of the data, failure of authors to provide relevant raw data upon request)
- Authorship issues and conflicts (post-publication conflicts of interest between authors, lack of knowledge of one or more of the authors, and ghost authorship identification)
- Plagiarism (the unauthorized or improper use of texts, sections, tables, figures, photos, ideas, or study designs)
- Duplication (repeatedly publishing the same scientific product)
- Fake-biased peer review (fake reviewer or biased review process)
- Informed consent issues (failure to obtain informed consent, failure to provide adequate and appropriate information to participants, or misleading participants)
- Ethical approval issues (failure to obtain ethics committee approval or failure to comply with the conditions of scientific research submitted to the ethics committee and fulfill its requirements even if approval has been obtained)
- Fraud (the intentional or deliberate falsification, fabrication, or misrepresentation of research results or the research process)
- Irregular citation pattern (citation pattern that does not comply with scientific norms and crosses ethical boundaries)
- No clear information (ethics violations are reported, but no details are provided)

If there were multiple reasons for retracting an article due to ethical violations, each reason was noted separately. There was no specific focus on a particular type of manuscript. All listed articles were reviewed. Even if an article contains multiple reasons for retraction, it was only registered once for the relevant country in country-based analysis.

No human or animal subjects were involved in this study. Ethics approval was unnecessary because the analysis was done using publicly available data.

Data were visualized using Microsoft Excel (Microsoft, Redmond, WA, USA). Data were expressed as number (n) and median (minimum–maximum).

Ethics statement

No human or animal was considered as a participant. Open data analysis was performed so ethics committee approval is not required.

RESULTS

The specified search strategy retrieved a total of 177 articles from Retraction Watch. The number of retracted papers, which was 2 in 2010 (minimum number of retractions), was 14 in 2022. The most retractions were observed in 2019 (n = 29) and 2012 (n = 28). **Fig. 1** illustrates the distribution of retracted papers over the years.

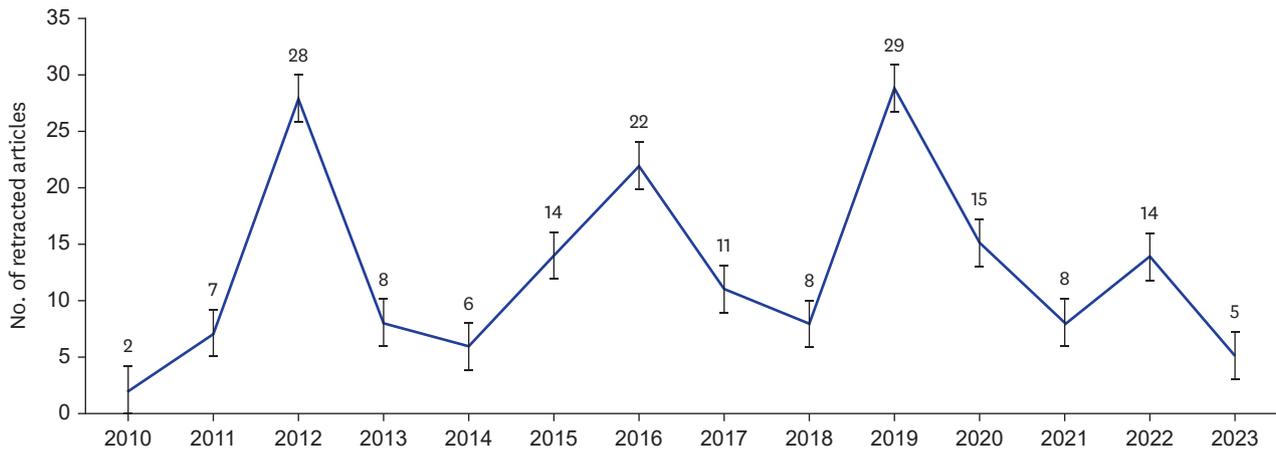


Fig. 1. Distribution of retracted publications from 2010 to 2023.

The median time interval between the initial publication date of the articles and the date of retraction was 647 (0–4,295) days. The median number of authors was 5 (1–26).

In the country analysis of retracted articles based on corresponding author, the top five countries were China (n = 47), USA (n = 25), South Korea (n = 23), Iran (n = 14), and India (n = 12) (Fig. 2).

The five journals with the highest number of retracted articles were *PLoS One* (n = 24), *Immunopharmacology and Immunotoxicology* (n = 19), *Tumor Biology* (n = 6), *Neuropsychiatric Disease and Treatment* (n = 4), and *Transplantation* (n = 4), respectively (Fig. 3). When the index status was evaluated, 97.18% (n = 172) of the articles were published in journals listed in PubMed, 73.44% (n = 130) in journals listed in MEDLINE, 88.13% (n = 156) in journals listed in Web of Science Core Collection and 89.83% (n = 159) in journals listed in Scopus.

The most common subject areas of the retracted articles were immunology (n = 27), neurology (n = 23), oncology (n = 21), toxicology (n = 16), and gastroenterology (n = 16), as shown in Fig. 4.

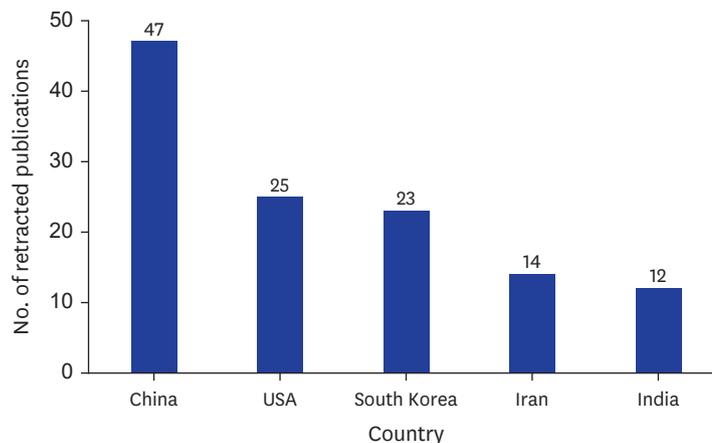


Fig. 2. Top five countries according to the number of retracted publications.

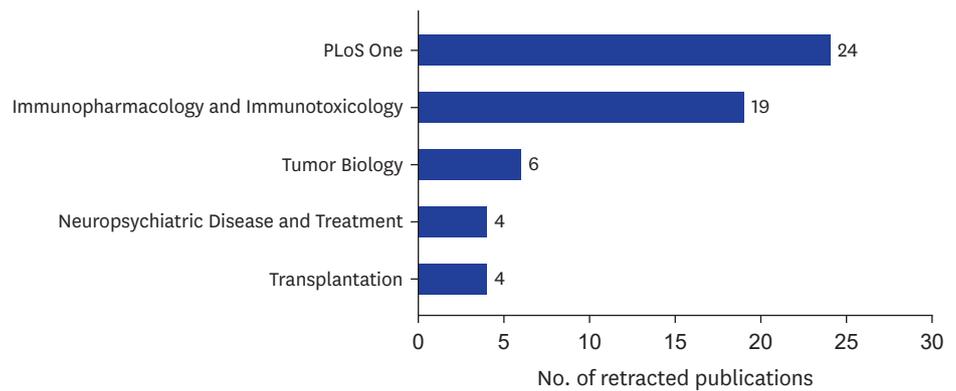


Fig. 3. The five journals with the highest number of retracted publications.

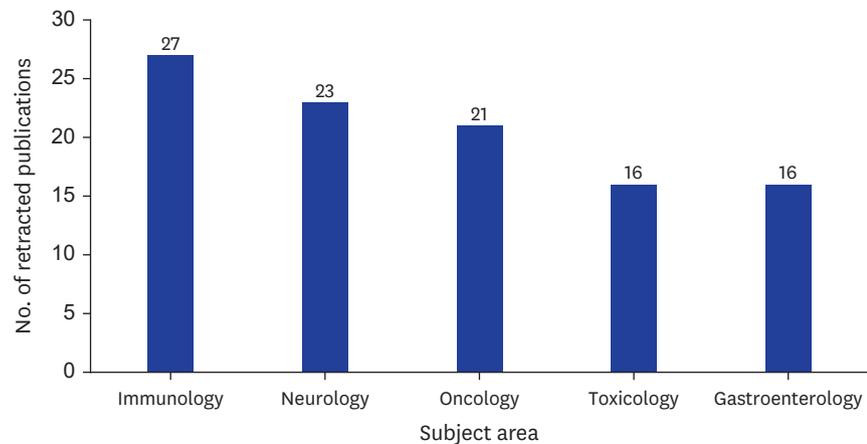


Fig. 4. The main subject areas of the retracted publications.

The reasons for retracting the papers were identified and classified as follows: fraud (n = 9), ethical approval issues (n = 65), informed consent issues (n = 45), fake-biased peer review (n = 30), duplication (n = 11), plagiarism (n = 25), authorship issues and conflicts (n = 20), data-related concerns (n = 51), irregular citation pattern (n = 1), and no clear information (n = 11) (Fig. 5).

DISCUSSION

One of the most significant barriers to scientific advancement is unethical behavior. The number of articles retracted for ethical violations in the medical literature has fluctuated from 2010 to 2023. The most common reasons were ethical approval issues, data-related concerns, and informed consent issues. The vast majority of articles were listed in reputable indexes.

The number of retracted papers due to ethical violations had two major peaks in 2019 and 2012, with a relatively smaller peak in 2016. There are articles in various biomedical disciplines that demonstrate an upward tendency in the number of retractions over time, as well as articles that do not support this result.¹³⁻¹⁶ Differences in the biomedical field, country, and period may underlie the discrepancy between the results. Our article focuses on the period between 2010 and 2023, as this time frame encompasses more than ten years

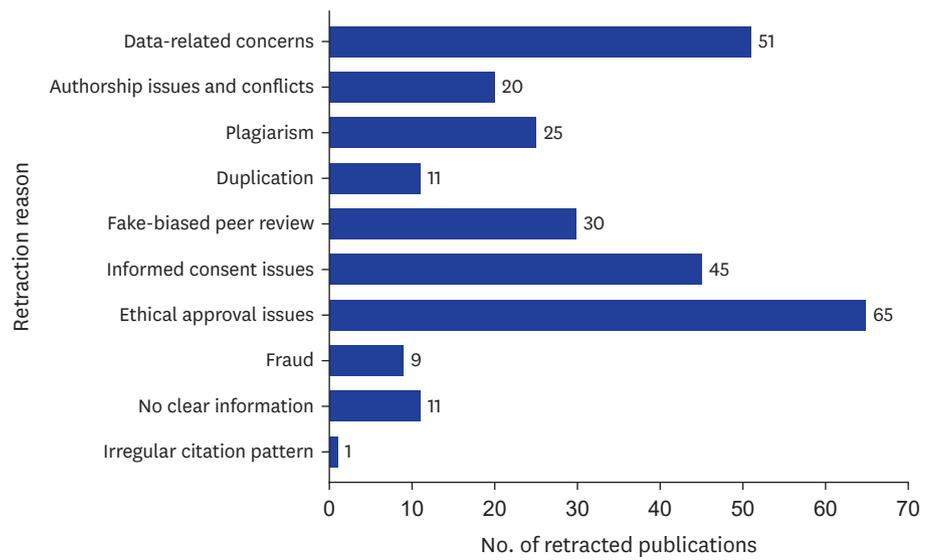


Fig. 5. Number of publications by retraction reasons (multiple reasons are available).

and includes over 150 articles, which we consider sufficient to identify any emerging trends. Additionally, by focusing on more recent data, we aim to provide a current understanding of retracted articles due to ethical violations.

The median period between the articles' first publication date and retraction date was 647 (0–4,295) days. Retraction analyses presenting shorter and longer time intervals are available in the literature.^{6,17,18} One of the most crucial objectives should be to minimize this time interval as much as possible. This prevents the spread of inaccurate-biased data and information.

The median number of authors of the retracted articles was 5. Tang et al.¹⁹ investigated the relationship between the number of authors and retraction. Furthermore, the effect of collaboration on the process was evaluated. The results did not support the assumption that retractions are the undesirable aspects of collaboration; instead, the idea that teamwork encourages ethical behavior came to the fore.

In the country-based analysis, China, the USA, South Korea, Iran, and India were at the forefront. Several retractions-based articles in the biomedical literature highlighted similar countries.²⁰⁻²³ These outcomes could be due to a variety of factors. Specified countries may be at the forefront due to their large population and amount of researchers. Therefore, calculating the number of retracted articles per researcher may give more accurate results. Young and inexperienced researchers in developing countries may be prone to ethical mistakes. These countries may have intense competition in the scientific field, and as a result, increasing pressure on researchers may result in unethical behavior.

PLoS One and *Immunopharmacology and Immunotoxicology* were the two journals that stood out by far in the number of retracted articles. Similar groups of researchers had prompted multiple retractions in both journals. This result suggests that authors with a propensity for ethical violations favor these two journals. Consistent with our results, Gasparyan et al.²⁴ determined that *PLoS One* was at the forefront regarding the number of corrections. This result was attributed to the 'publish first and judge later' approach. A considerable

proportion of the retracted papers were published in journals listed in reputable indexes. The high number of retractions in high-quality journals may be attributed to these journals having a large readership and a broad reach, allowing for more feedback from experienced researchers. This feedback could lead to the detection and reporting of violations, resulting in the retraction of articles that do not meet ethical standards. No country or journal is inherently resistant to publishing unethical articles. The initial step in preventing ethical violations is to make publications accessible to a large scientific audience and to reach experienced readers who can detect and report minor and major errors.

The field with the most retracted articles was immunology, followed by neurology and oncology. The high number of publications in these fields may increase the occurrence of retracted articles. Researchers with experience in these disciplines may have provided more criticism about unethical behavior to journals and editors. Additionally, academic competition may be more intense in these fields, leading some researchers to use unethical means to distinguish themselves. The availability of high research budgets and the potential for monetary rewards may also be factors.

The leading causes of retraction were, in order of frequency, ethical approval issues, data-related concerns, informed consent issues, and fake-biased peer review. Diverse reasons, including plagiarism, duplication, error, fabrication-falsification, unreliable data, and fraud, come to the forefront in retraction analyses conducted in various disciplines, periods, and databases.^{6,25-27} The focus of this article on ethical violations and the fact that the listing was compiled in this context drew attention to different reasons. In a substantial part of the articles, there was a declaration that ethical approval or informed permission was acquired. However, the required paperwork was not supplied to the journal upon request. Some articles did not adhere to the requirements stated in the ethical approval details, while others provided inadequate information to the participants. Post-publishing errors or manipulations were suspected in the papers under the title of data-related concerns. Raw data requests to authors were often left unanswered. Fake-biased peer review category of retracted articles involved cases where fake or biased peer reviews were used to influence the publication process. This included the creation of fake reviewers and email accounts submitted to journals to manipulate the review process.

Although it is not the primary goal of our post, it would be beneficial to provide suggestions on this issue. During submission, journals can request details about ethics committee approvals and informed consent. In addition, authors can submit English versions of the informed consent forms as supplemental material. This can help ensure that the proper ethical standards are met, and that the necessary documentation is provided to the journal.

Journals can collaborate with experienced statisticians and, when necessary, request raw data to discover errors and manipulations before publication. To avoid fake and biased peer reviews, editors should confirm each potential reviewer's identity and email account, mainly when the account is generic or non-institutional. In addition, possible conflicts of interest between reviewers and authors should be examined.²⁸ Particularly young researchers should be educated on the issues encompassed by unethical methods and their potential negative consequences. In addition, researchers should be shielded from the "publish or perish" pressure.²⁹ Editors should play a crucial role in preventing violations of ethics and take substantial steps in this regard. Rather than depending solely on software and online tools at this point, editorial experience and intelligence should take priority.

The biomedical literature evaluation in this article was based on a single database, and only articles that fell under the category of ethical violations were analyzed. Furthermore, the list starting from 2010 was used. Therefore, the generalization of results may be limited, despite revealing certain trends. Although the retraction reasons are accessible via Retraction Watch, no detailed retraction notes are provided. This is an inherent limitation of the database in comparison to PubMed. Additionally, some articles lacked details regarding detecting ethical violations, and the retraction notes were not uniform. No analyses based on article type were conducted. Due to the relatively small sample size, all listed articles were reviewed. It is essential to keep in mind that the data only reflects a snapshot and that the retraction of an article can occur even after a long time, making the data dynamic. The current article presented descriptive data; no further statistical analysis was conducted.

Conducting a thorough assessment of articles before publishing, establishing an unbiased peer-review procedure, and providing priority to chosen scientific papers are all essential components of scientific communication.³⁰ The number of articles retracted due to ethical violations in the medical literature has fluctuated from 2010 to 2023, with two notable peaks in 2019 and 2012. The main retraction reasons were ethical approval issues, data-related concerns, and informed consent issues. China, USA, South Korea, Iran, and India were the leading countries in the number of retractions. Immunology was the discipline with the most retractions, followed by neurology and oncology. In light of these findings, methods for preventing unethical behavior should be prioritized. Journals, editors, and scientific societies should take the initiative. The primary motivations that drive researchers to use these approaches should be examined.

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