

RESEARCH ARTICLE

Reasons for retraction of clinical research articles in PubMed indexed medical journals from 2012 to 2022

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Abstract

Background: Misconduct in the publication of research articles is a serious concern for the scientific community. This study was conducted with the objective to assess various reasons for retraction of clinical research articles published in PubMed indexed journals from all over the world since 2012 to 2022.

Methods: A search was performed on the PubMed database for retracted research articles using filters for "retracted publication". A total of 314 eligible research articles were assessed for studying basic details. The study outcome measures were to evaluate the reasons for the retraction and authors' and journal editors' responses to retractions.

Results: Of the original research articles retracted, 150/242 (61.98%) were clinical trial publications. Of the total 314 retracted research articles, the most retractions were in 2014 (47, 14.96%) and 2013 (40, 12.73%) while the fewest retractions were in 2012 (3, 0.95%) and 2022 (9, 2.86%). The most common reasons for retraction were data errors or data analysis errors (120/314, 38.21%) followed by plagiarism (37/314, 11.8%), duplicate publication (35/314, 11.1%), ethical concerns (23/314, 7.3%) and methodological flaws (22/314, 7%). These concerns were raised mainly by the editor or editor-in-chief (228/314, 72.61%), followed by authors (29/314, 9.23%). Out of 228 editorial concerns on publications, authors of only 91/228 (39.91%) agreed and 17/228 (7.45%) completely disagreed with the editorial decision.

Conclusion: Authors need to be more careful about data

analysis errors, fabricated or falsified data, and plagiarism while submitting their research papers. On the part of editors, detecting misconduct at the submission and peer review stages will help lower the retraction rate and avoid citation of such articles by other authors.

Keywords: retraction, plagiarism, PubMed indexed, ethics, peer review, publications, COPE, ICMJE, clinical trials.

Introduction

Retraction of publications is seen in almost all Indian and international journals irrespective of their indexing status. In other words, retraction of published articles is the metrics to correlate with the stringent journal policies and adherence to publication guidelines. The retraction could be due to multiple reasons such issues with data integrity, plagiarism, duplicate publication, and ethics. Similar reasons associated with retraction of articles have been assessed in a study by Singh et al in articles published between 2004 and 2013 in PubMed indexed journals [1].

Editors learning of publication misconduct in their journals are expected to publish a retraction notice on the journal website and inform indexing services. The article remains in the public domain on the journal website, digitally watermarked "Retracted", keeping it in the public domain. The retraction notice is carried on the journal and on indexing databases [2,3,4].

Retraction is not just limited to non-peer reviewed/low impact factor papers as seen during the Covid-19 pandemic, when two elite high impact factor medical journals viz the Lancet and the New England Journal of Medicine retracted different papers related to SARS-CoV-2 therapies due to data integrity concerns [5, 6, 7]. If the very foundation of evidence-based medicine becomes weak, it cannot provide robust and reliable results. Moreover, it can mislead the medical fraternity and affect patient trust and safety [8, 9, 10]. Reasons for retracted research articles have been previously published but restricted to dental journals [11]. This study was envisaged to evaluate the reasons for all types of research publications retracted by PubMed indexed journals from 2012 to 2022.

Methods

A search was performed on the PubMed database using the search term "Retracted," "retraction," "retraction of publication" and applying the PubMed filter for research

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articles from January 2012 through December 2022. Articles that had the word “retracted” used within the abstract/article/study title without actual mention of the retraction notice at PubMed or the journal website were excluded.

Case definition: A “retracted article” is an article that has been once published but has been withdrawn/given retraction notice due to any reasons as mentioned in the publication ethics guidelines of the Committee on Publication Ethics (COPE) [12].

Ethics committee approval

The study was exempted from ethics review (ECARP/71/2022) by the Institutional Ethics Committee of Topiwala National Medical College and BYL Nair Charitable Hospital.

Results

A PubMed database search yielded 660 articles. Based on the selection criteria, 314 retracted research articles were considered for the final evaluation.

Basic details of screened research articles

The retracted research articles were mainly original research that included clinical and basic research (242/314, 77.07%) and reviews that comprised review articles, narrative reviews, systematic reviews, meta-analyses, network meta-analyses, study protocols, and case studies (72/314, 22.92%) with a significant difference in the number of retractions across these domains ($p < 0.0001$, Odds Ratio = 11.29, 95% Confidence Interval = 7.78-16.39). The detailed distribution of all research articles is depicted in [Figure 1 \(available online only\)](#), with 150/314 (47.77%) retractions being clinical trial-related publications.

Country-wise distribution of retracted scientific research articles

The author’s affiliations were used to get country-wise details. In the period under study, the maximum retraction of published PubMed indexed scientific research articles were from China (88), followed by the United States (44), Egypt (30), Italy (25) and the United Kingdom (19). Six articles were retracted from India. “Others” category included Bulgaria, Kazakhstan, Belgium, Iraq, Jerusalem, Kenya, Malaysia, New Zealand, Nigeria, Philippines, Portugal, Greece, and Vietnam with fewer retracted articles [[Figure 2, available online only](#)].

Research articles retracted based on year-wise distribution

Table 1 gives information on articles retracted every year from 2012 to 2022. The least number of articles retracted were in 2012 and 2022. The maximum number of research articles were retracted in 2014 (47/314, 14.96%).

Reasons for retraction of published research articles

The most common reasons for retraction of 314 retracted research articles was found to be data/data analysis errors (38.2%), of which, on detailed analysis, fabricated/falsified data

Table 1. Year-wise distribution of retracted research articles from 2012 to 2022

Years	Retracted articles n (%)
2012	3 (0.95)
2013	40 (12.73)
2014	47 (14.96)
2015	31 (9.87)
2016	28 (8.91)
2017	32 (10.19)
2018	32 (10.19)
2019	28 (8.91)
2020	29 (9.23)
2021	35 (11.14)
2022	9 (2.86)

(92.5%, 111/120) was the most common cause. Other reasons included plagiarism (37/314, 11.8%), duplicate publication (35/314, 11.1%), ethical concerns (23/314, 7.3%) and methodological flaws (22/314, 7%). The most common ethical concern was failure to take ethics committee approval. In one case, as revealed on detailed investigation with author affiliated institute, the ethics committee approval letter provided was most probably fake, with unqualified members on the ethics committee panel. Failure to register the clinical study on a trial registry, or retrospective registering after participant enrolment was initiated or completed was another reason. The detailed reasons for retraction of clinical research articles published in PubMed indexed journals are mentioned in Table 2.

Stakeholders challenging the credibility and reliability of research articles

The maximum number of concerns with respect to quality and reliability of published research papers were raised by the Editors and Editors-in-chief (228/314, 72.61%). Authors requested retraction (29/314, 9.23%) for “honest errors”, followed by readers (10/314, 3.18%), post publication peer reviewers (4/314, 1.27%), publishers (3/314, 0.95%), and the authors’ institute (1/314, 0.31%).

Authors’ and journal editors’ response to the retraction of research articles

Authors of 91/314 (28.98%) research articles accepted the editorial retraction of their published papers, of which 19/91 (20.87%) papers were retracted at the request of the authors (honest errors). Of the 314, authors of 17 (5.41%) research articles disagreed with the retraction but did not give a satisfactory explanation or justifications or provide the raw data. There were 10/314 (3.18%) articles in which there was disagreement among co-authors for accepting the grounds on which their paper was retracted. In the case of 25/314

Table 2. Reasons for retraction of research articles over the period 2012-2022 (N=314)

Reasons for retraction of research articles	Retracted articles n (%)	Description of errors/issues for retraction of articles in journals indexed in PubMed
Data/ Data analysis errors	120 (38.2)	Fabricated/falsified data (111), statistical program errors (3), statistical analysis wrongly done (6)
Plagiarism	37 (11.8)	Content and figures plagiarism (29), data reused in tables and figures (4), not citing the articles from where the content was copied (4)
Duplicate Publication	35 (11.1)	Similar article published (10), same data and figures reused in several publication (25)
Ethical Issues	23 (7.3)	Ethics Committee approval not taken (16), permission not taken for using the dataset (1), No registration / retrospective registration / registration after enrolment on the clinical research registry (2), fake unqualified ethics approval (1), changes to protocol without ethics approval and registry update (1), wrong affiliation used (1), paying money for enrolling study participants (1)
Methodological issues	22 (7)	Wrong study design (2), baseline characteristics not balanced (2), results not reproducible using same method (2), not randomised (2), analytical method not reliable (4), confounders not addressed (4), sample size wrongly calculated (3), Outpatient data used instead of Inpatient data (1), treatment at different time points not as per study protocol (1), approach to primary outcome analysis not clear (1)
Author disputes/issues	13 (4.1)	Lack of author agreement (11), few authors unaware of submission of data for publication (2)
Compromised peer review process affecting the research integrity	6 (1.9)	Peer review inappropriately influenced (2), peer review performed by members of the Editorial board (1), third party involved in providing fabricated peer reviews for many manuscripts (3)
Administrative errors	3 (0.9)	Articles accidentally published by the publishers due to technical reasons (3)
Dual submission	2 (0.6)	Simultaneously submitting the same article to more than one journal (2)
Others	2 (0.6)	Technical (1) and legal reasons (1)
Reasons for retraction not specified	5 (1.5)	Retraction notice given but reasons not mentioned on either the journal or PubMed web portal (5)

(7.96%) articles, the retraction notice did not contain the author's responses as either the authors could not be contacted or the authors did not provide justification for the queries raised by the editors. Among authors of 29% (91/314) research articles who accepted their mistakes with no justification, apologised to editors, and the editors also apologised the readers for their administrative errors/lack of scrutiny.

To avoid any misunderstandings or interpretation on the part of the readers and the scientific community, retracted articles were digitally watermarked as "retracted" on all pages and retraction notices were carried on the journal and PubMed web portal in red text above the study title to bring to the notice of those reading the retracted papers. The full text of these articles was sometimes not available on PubMed though it could be accessed through the journal website.

The reasons for retractions were specified on PubMed for 223/314 (71%) articles. For the other articles, only the retraction notice was given on PubMed though the reasons

for retractions could be accessed through the retraction notices on the journal website (91/314, 28.98%).

Discussion

Publications must be retracted if research misconduct is proven. In the case of an error, the author's explanation is sought but even if their explanation is satisfactory, the decision to retract is based on the severity of the error; in some cases, a correction is considered appropriate and sufficient.

In most cases, authors fail to respond or provide satisfactory responses. As per our study, very few authors (19/91, 20.87%) accept their mistakes (honest errors) and request the editor to retract their publication. Errors do occur and within acceptable limits a correction notice can be issued. If fabricated or falsified data has been used in the publication, then the analysis will give flawed results and conclusions. Sometimes this issue gets aggravated with misinterpretation of the analysed data. Both these

misconducts can have serious consequences, misleading readers and the scientific community as misinformation is circulated on public platforms. Violations of ethical principles in research publications reported in the literature include not taking patient consent, not taking approval from the Institutional Ethics Committee or appropriate authorised body, not following the International Committee of Medical Journal Editors (ICMJE) criteria for authorship allocation, or research violations in clinical trials.

Adherence to publication ethics guidelines set by COPE and ICMJE should be mandated for all peer reviewed and indexed journals. Although we do not recommend severe punishment for authors found to have committed scientific misconduct, we recommend changes in the editorial process to increase scrutiny resulting in early detection of scientific misconduct in suspected research articles. Stringent scrutiny will lead to rejection of such articles at an early stage and cut down the rates of retraction of articles once published in the public domain which can mislead other readers. Journals should have a section for retracted articles separately on their journal portal making it convenient for the readers. The use of retraction rate metrics/indices (like article rejection rate metrics) should be notified on the journal homepage to warn authors before submitting papers with scientific misconduct which will also help journals to improve on their deficiencies to reduce retraction rates as well, maintaining a good impact for dedicated researchers who wish to submit papers to these journals. Those published research articles suspected of scientific misconduct must have tag of "under scrutiny by journal" mentioned on their website to reduce the number of citations given to such papers. There is a need for more retraction databases like "Retraction Watch" (<https://retractionwatch.com/>), where the readers can filter scientific articles (archived since august 2010) to know the retraction status of high risk papers associated with any kind of scientific misconduct [13]. Some authors even fail to mention or disclose the conflict of interest, funding and acknowledgement statement [14]. Sometimes, the error may occur on the part of the editors/publishers as few cases of acceptance of publication by mistake without peer review or a compromised peer review process that comes to the editor's notice later, plagiarised content in the manuscript which comes to editor notice after concerns raised by the readers once the manuscript is published. Apart from these, readers, researchers and scientific community need to beware of the predatory journals and conferences aggravating misinformation issues [15]. The retracted articles remain in the public domain even after tagging or watermarking the retracted article on all its pages. The readers and authors need to be very careful while reading or citing such retracted articles. However, there exists a delay from the time of publication to retraction of the articles. As a result, these papers are cited multiple times by the other scientific papers until the retraction notice is issued by the journal editors which is inevitable and cannot be rectified. Retraction watch is one such database that keeps check on the retracted articles,

allows to search retracted articles with author name and also creates alert about scientific misconduct by authors/researchers in scientific community. The authors need to follow the COPE and ICMJE guidelines for publishing their articles. Singh et al evaluated the various factors associated with retraction of scientific articles (N=2343) between 2004 to 2013 and raised concerns about the increasing retraction rate in recent years with no significant correlation seen between the journal impact factor and retraction [1]. Shamim et al reported that duplicate publications, plagiarism, authorship disputes were the major cause of retractions in PubMed indexed dental journals [10]. Samuel et al screened 198 articles in dentistry (2015-2020) that revealed maximum retractions of dentistry-related research originated from USA (34.8%) and India (25.3%) with plagiarism (38.02%) cited as the most common reason [16]. Bolland et al discussed about issues related to citations of retracted publications with majority of the citations to retracted articles were before the retraction notice was issued [17]. A letter to the Editor by Peterson et al revealed that 1,25,000 articles published/released in first ten months of the Covid-19 pandemic had an unusual high number of retractions within a short duration raising serious concerns about the publishing process and research quality even in elite and PubMed indexed peer reviewed journals [5].

Limitations

The study only assessed the reasons for retraction of PubMed/Medline indexed articles, which may contribute to potential selection bias. Moreover, we could not evaluate the reasons for retraction of published articles wherever the reasons were not specified either on the PubMed or on the journal website as only the retraction notice was given in such cases.

Conclusions

Journal editors need to develop robust and effective strategies to scrutinise manuscripts submitted by authors [18]. Most common reasons for retractions are data/data analysis errors, fabricated/falsified data and plagiarism in original research and authors need to be careful while submitting research articles for publication. The purpose of retractions should be to promote reliable information on public domain and to maintain research integrity among the scientific community and general public rather than punishing any author. The retraction notice and reasons both need to be specified clearly on both the journal website as well as on the PubMed.

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