



A Comprehensive Analysis of Articles Retracted Between 2004 and 2013 from Biomedical Literature – A Call for Reforms

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ABSTRACT

Science is a dynamic subject and it was never free of misconduct or bad research. Indeed, the scientific method itself is intended to overcome mistakes and misdeeds. So, we aimed to assess various factors associated with retraction of scientific articles from 2004 to 2013. Data were retrieved from PubMed and Medline using the keywords retraction of articles, retraction notice, and withdrawal of article in April 2014 to detect articles retracted from 2004 to 2013. Statistical analysis was carried out using *t*-test and Karl Pearson's correlation coefficient. Results showed that a total of 2343 articles were retracted between 2004 and 2013, and original articles followed by case reports constituted major part of it. Time interval between submission and retraction of article has reduced in recent times. Impact factor and retraction do not have any significant correlation. We conclude that although retraction of articles is a rare event, its constant rise in scientific literature is quite worrisome. It is still unclear whether misconduct/mistakes in articles are increasing hastily or the articles are retracted at a rapid rate in recent times. So, it should be considered as an urgent issue and it is the responsibility of journal editors to track misconduct by following Committee on Publication Ethics (COPE) guidelines and making an effective strategy.

Key words: Duplication of article, Plagiarism, Retraction of articles, Self-correction

INTRODUCTION

Retraction refers to an article in its entirety that is the result of a pervasive error, non-reproducible research, scientific misconduct, or duplicate publication. Retractions identify an article that was previously published and is now retracted through a formal issuance from the author, editor, publisher, or other authorized agent.^[1] The number of articles retracted has increased rapidly in recent years.^[2]

The number of retractions in journals covered by the Science Citation Index Expanded has increased 20 times between 1990 and 2008.^[3] So, we aimed to study various factors governing retraction of scientific articles by analyzing all the retracted articles between 2004 and 2013.

SELECTION OF DATA

Data were retrieved using PubMed and Medline, a bibliographic database of biomedical literature, using the keywords retraction

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of articles, retraction notice, and withdrawal of article in April 2014 to detect articles retracted from 2004 to 2013, and were spread over Microsoft Excel sheet. We assessed all the factors associated with retraction of articles where the text was available in English. For each retraction, we recorded the article type (e.g. original research, review article, case report, letter) and the reason for the retraction (e.g. data fabrication or falsification, suspected fraud, scientific error, unethical, plagiarism, duplicate publication, or other causes like publisher error, authorship disputes, copyright infringement, or unknown causes). We also noted the time interval between publication and retraction of a particular article. We also selected the 15 journals with 2012 Institute for Scientific Information (ISI) impact factor (IF) more than 15 given by Thomson Reuters, and analyzed the number of articles retracted in these journals and also the time period between publication and retraction of the article. Results obtained were analyzed statistically by *t*-test and Karl Pearson's correlation coefficient applying Statistical Package for the Social Sciences (SPSS) software. *P* value less than 0.05 is considered as statistically significant.

A total of 2343 articles were retracted between 2004 and 2013 and were considered for evaluation [Table 1]. Table 1 shows that in both 2004-2008 and 2009-2013 periods, original articles followed by case reports and reviews constituted maximum percentage of total retracted articles.

Various reasons for retraction of articles

In Table 2 are presented the various reasons for retraction of articles, which shows the most cited reasons as mistakes, plagiarism, and duplicate submission over the period of 10 years [Table 2]. While determining whether the use of plagiarism detection software may have increased the detection of plagiarism in published articles, we found that the time interval between publication and retraction of articles had reduced significantly in 2009-2013 as compared to 2004-2008 [Table 3]. Table 3 shows that the time interval between publication and retraction has reduced significantly in recent times (2009-2013) as compared to previous years (2004-2008).

Impact factor and retraction of articles

Correlation was determined between the number of articles retracted and the time between retraction and publication for all journals having an IF more than 15 using Pearson's correlation coefficient [Table 4]. Table 5 shows that there was statistically nonsignificant relation between the IF, the number of articles retracted, and the time between retraction and publication.

Committee on publication ethics described retraction as a mechanism for correcting the literature and alerting readers to publications that contain such seriously flawed or erroneous data that their findings and conclusions cannot be relied upon.^[4] A total of 2343 retracted articles were found between 2004 and 2013. Corbyn *et al.*^[3] evaluated the retracted articles in 1990-2008 and Cokol *et al.*^[2] in 1950-2007, and found nearly 10-fold increase in the incidence of retraction.

Type of articles retracted

We observed that most of the articles retracted in scholarly literature are original articles followed by case reports and review

articles [Table 1]. So, we can say that there is more potential of fraudulent data in experimental studies than in other types of articles. Fraudulent data are not new in science. Gregor Mendel, the father of genetics, may have selectively modified his data in support of his results, and statistics suggested that Mendel's data are biased in the direction of agreement with expectation.^[5]

Present study revealed that mistakes and plagiarism are the major reasons cited for article retractions than other reasons such as plagiarism, duplicate submission, fabricated data, or ethical disputes [Table 2]. Similar findings were also obtained in a previous study by Nath *et al.*,^[6] who evaluated retractions listed in Medline between 1982 and 2002. They observed that misconduct attributed to 27% of retracted articles and errors constituted 62% of retrac-

Table 1. Various types of retracted articles and the time mean time interval between publication and retraction of articles

Year	Number of retractions	Original	Review	Case reports	Others	Mean time interval between publication and retraction (in months)
2004	69	24	14	29	2	40
2005	71	26	08	35	2	38
2006	133	60	15	54	4	28
2007	140	56	26	52	6	22
2008	235	86	50	91	8	18
2009	270	114	54	94	8	16
2010	258	116	42	94	6	14
2011	377	174	71	120	12	14
2012	388	192	82	106	8	10
2013	402	208	76	108	10	8
Total	2343	1056	438	783	66	208

Table 2. Reasons for retraction of articles from 2004 to 2008 and from 2009 to 2013

Reason for retraction	Number of articles retracted	
	2004-2008	2009-2013
Mistakes (honest errors)	204	474
Plagiarism	144	440
Duplicate publication	116	390
Fabricated data	86	187
Author dispute	12	51
Ethical issues	13	17
No reason	74	136
Total articles	648 articles	1695 articles

Table 3. Mean time interval between publication and retraction (in months)

Year	Number of retracted articles	Post publication to retraction		<i>P</i> value
		Mean±SD	Standard error	
2004-2008	648	31.2±10.35	4.63	0.01273 (Significant)
2009-2013	1695	12.4±3.28	1.47	

SD: Standard deviation

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