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Assessing Retractions in Indian Science: An Analysis of Publications from the Past Three Decades Using the Web of Science Database

Bhaskar Mukherjee* and Priya Tiwari
Department of Library & Information Science, Banaras Hindu University, Varanasi - 221005, India
Email: mukherjee.bhaskar@gmail.com

ABSTRACT

The growth in the number of retracted publications in academic fields suggests that the problem is not isolated but rather reflective of broader challenges in the research environment. This study seeks to address these concerns by focusing specifically on the trends and characteristics of retracted papers in Indian scientific publications. We examine the trend through 3162 retracted publications that appeared during 1990-2024 indexed in Web of Science database. It was observed that although a number of retracted publications were present in 1990 to 2016, the increase was more after 2016 and was highest in 2022, before declining in 2023. Most of these publications were published under collaborative authorship and 38.52 % publications came under international co-authorship with 66 countries including Ethiopia, Saudi Arabia, China, USA and received 13.60 citations per publication. There were 25.93 % publications published through institutional funds and 45.47 % publications appeared in non-OA journals. Subjects like computer science (fields like internet of things, machine learning, deep learning), medical science (apoptosis, oxidative state, covid-19), material science (nanotechnology, nano-tubes, polymer science) are the major three disciplines in where most of retractions were noticed. Highest number of retracted publications appeared in the journals having IF range 5.0 to 9.99 followed by 3.0 to 3.99. The rate of retracted articles did not necessarily decrease with increase of impact factor suggesting greater scrutiny of high-profile publications does not have an impact on retraction. Plagiarism was found as one of the major reasons for retraction followed by compromised peer review, emphasizing the need for stricter regulatory frameworks and better research practices.

Keywords: Retracted papers-India; Retraction-reasons; Retraction-Indian science; Retracted articles-India

1. INTRODUCTION

Scientific papers are the backbone of academic and research communication, offering a formal channel to share new discoveries, theories, and innovations with the global scientific community. These papers not only contribute to the cumulative knowledge of a particular field but also serve as a foundation for further research, policy development, and practical application(1). As such, the integrity and accuracy of published research are of paramount importance. The peer review process is designed to ensure the quality, relevance, and originality of papers, scrutinising them before they are accepted for publication[2]. However, despite the rigor of peer review, certain publications fail to uphold the standards of publishing in a long term. This is where retractions come into play.

Retraction of a paper occurs when certain flaws, ethical issues, or misconduct, such as data manipulation or plagiarism, come to light after publication[3]. Retractions, though often perceived negatively, are an essential mechanism to safeguard the credibility of qualitative scientific record. Retractions also serve as examples for the academic community, underlining the importance of maintaining rigorous standards[4].

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In the present academic context, however, the increasing number of retracted papers raises concerns about the pressures, researchers face to publish. These pressures, often linked to career advancement, funding, or institutional prestige, can lead to rushed or compromised research practices[5]. Additionally, the globalised nature of research collaboration may add complexity to ensuring consistent ethical standards across borders. Several studies have explored the reasons behind retractions globally, noting the role of factors such as plagiarism, data fabrication, and unethical authorship practices[6-7]. A meta-analysis by Khan[8], *et al.* revealed that a substantial proportion of retractions are due to misconduct, highlighting systemic issues in the research environment. Despite India's growing prominence in the scientific landscape, there is a lack of comprehensive studies that examine the characteristics of retractions in Indian publications. While much of the existing studies tend to focus on global retraction trends, there has been limited attention on region-specific patterns such as country collaboration, subject fields of journals and relation of journal impact factor with retraction, particularly within developing research ecosystems like India.

This study seeks to fill this research gap by focusing specifically on the characteristics of retracted papers in Indian scientific publications from the last thirty years.

The growth in the number of retracted articles suggests that the problem is not isolated but rather reflective of broader challenges in the research environment[9]. By analysing the characteristics of retracted papers, including country of collaboration, subject fields of journals and their retraction rate and relation of journal impact factor with retraction, this study aims to shed light on patterns that could be driving the increase in retractions.

Moreover, it seeks to understand why highly cited papers are being retracted, despite their apparent impact on the field. The phenomenon of retracting widely referenced work calls into question the role of citation as a marker of quality and raises important questions about the reliability of the scientific publishing system. This study is, therefore, significant for academic community, offering insights that could inform policies aimed at reducing the incidence of retractions while fostering a robust research environment.

2. LITERATURE REVIEW

Retractions occur when published papers are found to contain errors, misconduct, or unethical practices[10]. Over the past decade, there has been a noticeable increase in the number of retracted scientific papers, both globally and within Indian scientific literature. A comprehensive analysis by He[11] highlighted that the rise in retractions could be attributed to improved detection mechanisms for plagiarism and data manipulation, increased scrutiny and heightened awareness of ethical standards in research. Retraction rates in veterinary medicine increased from 0.03 to 1.07 per 1000 articles between 1993 and 2019[12]. Approximately 25 % of the retracted papers appeared in the top 15 journals within the biomedical field[13]. Majumder[14], *et al.* found that the number of retracted documents in ophthalmic literature has risen since 2010. Anderson[15], *et al.* analysed 68 retracted COVID-19 articles, noting that 22 of them were withdrawn for unspecified reasons.

India's research output has expanded rapidly, making it one of the leading contributors to global science. However, this growth has been accompanied by an increase in retracted articles, raising concerns about research practices and regulation. A new study has indicated that the increase in retractions may be linked to the pressure on researchers to publish frequently, often under the mantra of "publish or perish"(16). Grienesen and Zhang[17] categorised the features of retracted articles into time between publication and retraction, geographical distribution of authors, and involvement of research institutions. Studies have shown that retracted papers are often produced by international collaborations, particularly in fields with high competition, such as biomedicine and engineering[18]. Indian retractions frequently involve collaborations with researchers from the United States and European nations, reflecting the synergetic nature of contemporary research[19].

Authorship patterns in retracted papers reveal that papers with multiple authors, especially those from diverse geographical backgrounds, have a higher incidence of retractions. This may be due to the challenges inherent in managing large, cross-border research projects, where differences in research standards, communication issues, and lapses can lead to errors or misconduct[20]. Moreover, certain research domains, such as life sciences and medical research, show a higher prevalence of retractions, largely because these fields are subject to more rigorous scrutiny due to their direct impact on public health and policy[21].

One of the more perplexing aspects of retracted publications is the persistence of citations even after the paper has been formally withdrawn. This study has explored the reasons behind the retraction of highly cited articles, with many studies concluding that citation volume alone is not an indicator of the reliability of research[22]. In fact, some of the most cited papers are later retracted due to serious ethical breaches, such as falsified data or plagiarism, despite their apparent influence on the field. The reasons for the continued citation of retracted papers vary. Some researchers may be unaware of the retraction, while others may cite the paper as part of a larger critique of the research. Furthermore, highly cited papers often continue to be referenced because their findings are deeply embedded in the literature, making it difficult to erase their impact even after their retraction[23]. This trend is particularly concerning in the context of Indian scientific publications, where retracted papers in influential fields such as medicine and pharmaceuticals continue to shape ongoing research, despite their flawed foundations[24].

A recent study examining the impact of retraction on citation counts in psychology journals found out that journals with higher impact factors and open access models were more effective in reducing citation of retracted articles[25]. Further, errors in data analysis, misinterpretation of findings, and methodological flaws are frequently cited as reasons for retraction[26]. These errors often go unnoticed during the initial peer review process, only to be discovered after the paper has been widely circulated[27]. Consequently, the retraction of such papers can potentially undermine entire research projects that were based on the flawed findings of these highly cited works.

The literature on retracted papers emphasizes the complexity of the issue, particularly within the context of Indian scientific publications. The growth of retracted articles, the distinctive characteristics of these papers, and the puzzling trend of retracting highly cited works all point to broader systemic challenges within the academic research community. Understanding these dynamics is crucial for ensuring the reliability of published work, and fostering a more ethical and responsible research environment.

3. OBJECTIVES

1. To know the growth of retracted articles of Indian scientific publication;
2. To analyse the characteristics that are visible in terms of authorship, country of collaboration, domain of research, accessibility and subjects for retracted articles; and
3. To identify, what are the reasons of retraction?

4. METHODOLOGY

The investigation journey started with identifying the retracted articles marked by journals that were published by Indian authors, solely or jointly. For that, the well-known international database Web of Science (WoS) was searched in the mid of August 2024. A simple search string consisting of author address as 'India' and document type 'Retracted Publications' connected through Boolean operator AND was used in WoS Core Collection. Only those articles were identified where at least one author in the authors group belonged to an institution that is located in India. A total of 3216 articles were in the list. The searched results were downloaded, merged and then removed duplicates to identify unique titles. The total final such unique articles were 3162 for analysis. Further, it was incorporated into various statistical software including *Biblioshiny*. Since WoS downloaded results contain tags like 'WC' (Web of Science Categories), 'SC' (Research Areas), 'OA' (Open access indicators), 'SO' (Publication name), 'PY' (Year Published) etc. these were used directly for analysis.

To know the reason for retraction of highly cited articles published by Indian authors, each article was downloaded through open-source reference management software and confirmed the date, cause and other related information of retraction. Although Retraction Watch database displays the results with reasons of retraction, we believe that manual excavation leads to more specific answer.

5. RESULTS AND DISCUSSION

5.1 Occurrence of Retracted Literature

The data related to the growth of retracted Indian publications during the last three decades is shown in fig. 1. We found a total of 3162 publications indexed in WoS as retracted/retraction publications which is a bit less than Retraction Watch's data (3334 publications). The Line APY shows the article publishing year whereas the line ARY shows its retraction year. WoS introduced the term 'Retracted' in 2016, however, this is applied to all items that are indexed in database since their inception. There are two versions of retraction notes available in WoS: 'Retracted Publication' and 'Retraction'. While 'Retraction' is used for articles that contains a published statement from the editor or author announcing that the item is being retracted and the reason of retraction is mentioned, 'Retracted Publications' are those that have been retracted by an author, editor, institution or a publisher and the retraction notice is published.

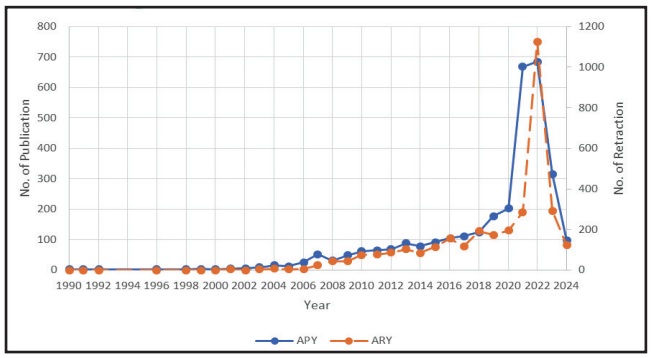

Figure 1. Occurrence of retracted literature in Indian science.

Looking at the figure, it becomes clear that although the trajectory of retracted Indian publications was noticed as back as 1990 (only 1 instance) and up to 2003, it was below 10 instances (SD=0.4), the number increases slowly thereafter and up to 2015, it was below 100 instances (SD=37.68). From 2016 onwards, there was a regular increase of more than 1.2 folds than preceding year (SD=27.25), but from 2021 to 2022, such jump was almost 6 folds and reached to the highest in 2022 (SD=420.5), before declining in 2023 (the data for 2024 is only half of the year). While confirming whether increase in retraction is merely because of the increase in total publications, we observed that these two datasets show correlation coefficient of 0.7635 meaning increase in publication has almost 76 % positive impact on increase in retraction, but not on the whole. The change in the retraction rate from 2021 onwards i.e. Covid and post-covid period, may be hypothesised as technological: because of shut-down in academic institutions, researchers faced access restrictions to authentic sources and mostly relied on easily accessible resources. However, widespread use of internet-based tools enables publishers to increase the level of scrutiny during peer-review process and detect the flaws quickly[28]. However, it is not clear which may be a possible major reason for such increase in retraction during recent past, whether because of publication pressure or because of increased awareness, by which flawed articles are recognised.

5.2 Characteristics of Retracted Publications

We observed that during 1990-2024, a total of 3162 publications are indexed in WoS as Retracted/Retraction Publication with an annual growth of 14.4 %, however most of the publications were under collaborative authorship and 38.52 % publications came under international co-authorship with 66 countries. Only 4.45 % publications were published under solo authorship. These publications received a moderate volume of citations (13.60 citation per publication), despite there were 59 publications that received more than 100 citations each up to mid of August 2024. Most of the retracted publications (2176 or 71.97 %) were in article form followed by review article (4 %) or others. There were 690 articles in the process of retraction and most of them were in the form of article too. Of these publications, 2369 or 74.29 % publications were published by Indian authors as reporting authors and received 14.14 Citation Per Publications (CPP). There were 820 or 25.93 % publications that were funded, mostly by Indian governments, and received 21.93 CPP. A total of 1438 or 45.47 % publications that were appeared as non-open access received 16.04 CPP and 54.53 % that appeared in open access forms like green, gold, bronze and hybrid received 18.17, 8.54, 9.76, and 10.79 CPP.

Since a considerable volume of publications appeared in international collaboration, it was our interest to know what are those countries with whom Indian authors did collaborate and their articles were retracted. The fig. 2 shows the world map.

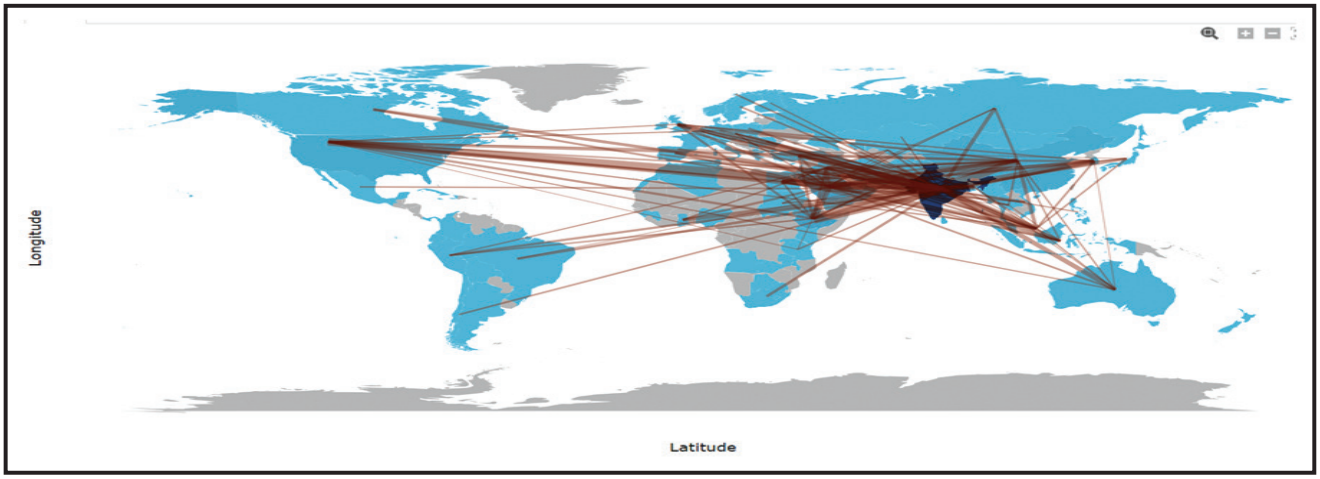

Figure 2. World map of Indian collaborative retracted publication.

On looking at the collaborative countries of retracted articles, we observed that a major portion of retracted publications published jointly in collaboration with other Indian institutes (1884 intra-country and 332 inter-country collaboration), followed by Ethiopia (302 instances), China (102 instances) Bangladesh (56 instances) and the USA (53 instances). However, the articles that were published in collaboration with Ethiopia received 2054 citations (6.80 CPP or citations per publication), with USA (36.58 CPP), Saudi Arabia (20.63 CPP), China (9.64 CPP) and Bangladesh (9.39 CPP).

Next, we plot the three fields (Author's country Keywords-Source Journal) diagram to establish relationship between fields as showcased in fig. 3. The top 10 basic subjects, their subfields and number of retracted articles in shown in table 1.

To establish relation between number of authors per article and the retraction rate, it was observed that articles with more authors have a smaller number of retractions than articles with a smaller number of authors. There are 525 retracted articles written by 3 authors, whereas there were 416, 367, 348, 259 retracted articles written by 4, 5, 6, and 7 authors, respectively. To test how many times authors have had multiple articles retracted while serving as a corresponding author, it was observed that there were 274 retracted articles written by same authors with 2 retractions, 35 articles with 3 retractions, 21 articles with 4 retractions and 28 articles with >5 retractions since 1990. Such cases were only 37 when same foreign author served as corresponding author. However, it was seen that authors with multiple retractions appear to have collaboration with certain individuals, which may indicate team culture or attitudes of team members have relation with scientific misconduct. These findings are in accordance with the findings of Zhang and Fu[29].

It is true that most of the topics in any scientific discipline today overlap with another subject, due to which it is impossible to group any idea only under a specific subject. Therefore, table 1 does not truly signify the corresponding journals of a broad field or sub-areas are not exactly representative of the journals to which the idea belongs. Rather, the data shows that computer science (fields like Internet of things, machine learning, deep learning), medical science (apoptosis, oxidative state, covid-19), material science (nontechnology, nano-tubes, polymer science) are the major three disciplines in where most of the retractions were noticed. Subjects like plant science, environmental science, food sciences etc. have less retracted publications than the former. It is important to note that when Indian authors collaborated with intra-country or inter-country collaborators in the research areas like apoptosis, deep learning, oxidative state, machine learning, their works were retracted. However, when Indian scientists worked together in the research areas like covid-19, cloud computing, internet of things, big data with Ethiopia, Saudi Arabia, China or USA, their works were lesser retracted.

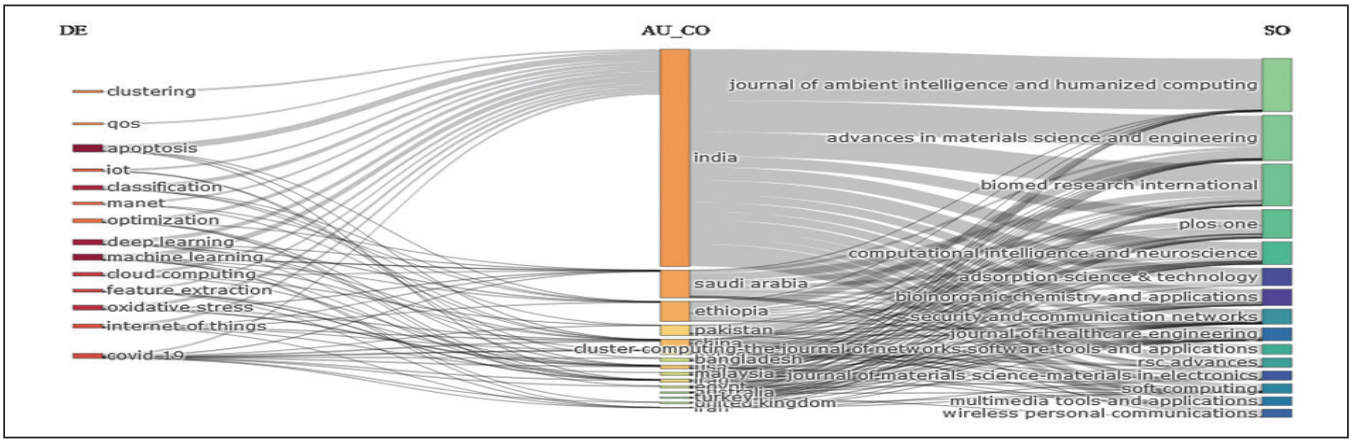

Figure 3. Three fields plot.

Table 1. Subject fields, journals and retraction rate

Broad area & journals (no. of retracted publ.)	Sub areas	Frequency
Computer Science	Artificial Intelligence	355
Journal of Ambient Intelligence and Humanized Computing (355)	Information Systems	67
Cluster Computing-The Journal of Networks Software Tools and Applications (62)	Software Engineering	47
Security and Communication Networks (48)	Hardware & Architecture	43
Material Science	Multidisciplinary	163
Advances In Materials Science and Engineering (114)	Physics	43
Journal of Materials Science-Materials in Electronics (38)	Nanoscience & Nanotechnology	28
Journal of Nanomaterials (21)	Polymer Science	11
Chemistry	Multidisciplinary	150
RSC Advances (51)	Applied, Physical	37
Bioinorganic Chemistry and Applications (33)	Chemistry; Engineering	39
Adsorption Science & Technology (37)	Chemistry; Materials Science	18
Biotechnology & Applied Biology	Research & Experimental	101
Biomed Research International (101)	Biochemistry & Molecular Biology	45
Plos One (81)	Microbiology	16
Journal of Biological Chemistry (25)	Biotechnology & Applied Microbiology	18
Mathematical & Computational Biology	Neurosciences & Neurology	70
Computational Intelligence and Neuroscience (70)	Mathematics	31
Computational and Mathematical Methods in Medicine (26)	Mathematical & Computational Biology	26
Neural Computing & Applications (20)	Mathematics, Applied	11
Medicine, Pharmacology & Pharmacy	Pharmacology & Pharmacy	55
Journal of Healthcare Engineering	Health Care Sciences & Services	46
Evidence-Based Complementary and Alternative Medicine (27)	Integrative & Complementary Medicine	44
Journal of Medical Systems (12)	Oncology	17
Engineering	Telecommunications	49
Wireless Personal Communications (45)	Electrical, Electronic, Applied	40
Journal of Sensors (30)	Instruments & Instrumentation	40
International Journal of Electrical Engineering Education (27)	Mechanical	26
Food Science & Technology	Food Science & Technology	36
Journal of Food Quality (31)	Toxicology	9
Carbohydrate Polymers (7)	Food Science & Technology; Nutrition & Dietetics	6
Environmental Sciences & Ecology	Environmental Sciences & Ecology	28
Journal Of Hazardous Materials (16)	Green & Sustainable Science & Technology; Energy & Fuels	12
Scientific Reports (17)	Engineering, Environmental	17
Environmental Science and Pollution Research (9)	Public, Environmental & Occupational Health	13
Plant Science	Plant Science	23
Life Sciences (15)	Agriculture	13
Plant Cell Tissue and Organ Culture (11)	Biology	11
Acta Agriculturae Scandinavica Section B-Soil and Plant Science (7)	Cell Biology	9

Since it was observed that retracted articles have appeared in diversified journals (783 journals, including 68 publications from Indic origin journals), we have attempted to analyse whether any relation between Journal IF and retraction exists. It may be postulated that journals having high IF have reasonable high peer-scrutiny process and the chances of retraction may be high. Further, the ratio of the proportion of retracted publications without IF and with IF is 1: 5.44. As indicated in Table 2, most of the retracted publications appeared in journals having IF range 5.0 to 9.99 followed by 3.0 to 3.99. Comparatively lesser number of publications have appeared in journals having low JIF. However, irrespective of different ranges, most of the retracted articles received as much as 3-7 citations and most of the articles in each IF range did not receive any citation. Higher value of SD with high IF range indicates the difference in citation from the mean is quite high in the range IF > 10 or IF 3.0 to 3.99.

Table 2. Relation of journal impact factor with retraction

IF range	No. of retracted publications	CPP	Median	Mode	SD
Not have IF	485	13.98	3	0	32.81
0	5	3.6	4	0	3.78
0.1 to 0.99	57	6.82	3	0	23.14
1.1 to 1.99	484	5.83	3	0	11.34
2.0 to 2.99	526	8.53	3	0	17.54
3.0 to 3.99	606	15.78	6	0	57.57
4.0 to 4.99	166	19.12	4	0	40.13
5.0 to 9.99	765	17.13	7	0	36.78
> 10	66	40.1	16.5	0	68.31

Next, we were interested to know whether articles were cited by others even after their retraction. To analyze such facet, we had adjusted the citation profile of top 100 highly cited articles with retraction year. Every reference style has provision to cite retracted article by adding the word 'Retracted' with the title of the publication.

From fig. 4, it is clear that articles received citation despite being retracted. Of the total top 100 cited articles, we observed that there were 98 articles which were receiving citation in spite of being retracted, meaning retraction has no influence on citation. Also, of these top highly cited 100 articles, earliest article appeared in 2000 and latest in 2022. Articles published between 2000 and 2010 took on an average 8.18 years to retract (Time-to-retraction) but received 64.75 CPP after retraction whereas, articles published between 2011 and 2022 took only 4.14 years to retract and received 36.7 CPP after retraction. Therefore, we do not find any correlation that retraction is the reason of low citation in any stage.

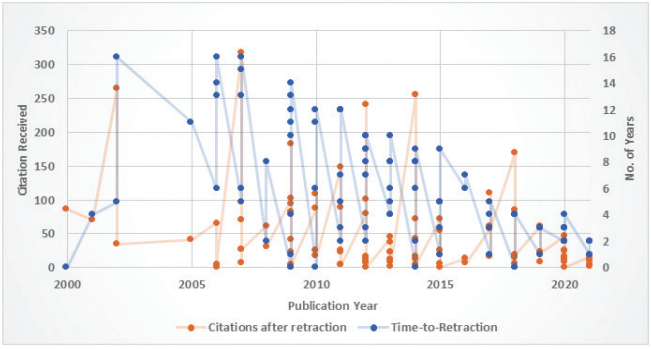

Figure 4. Citation profile of pubications after retraction.

5.3 Reason of Retraction

The reasons for retraction of scientific papers are varied and often stem from violations of academic integrity and methodological flaws. They are important yardsticks to measure the circumstances under which a paper may be retracted from the global scientific community. In table 3, we have categorised various reasons encountered into 7 broad categories which emerged as the major causes for retracted articles.

Table 3. Reasons of retractions

Broad category	Reasons covered	No of publications
Plagiarism	Duplication of article, image, concerns about referencing/ attribution	1690
Error and unreliable results	Error in methods, analyses, text/results, contamination of materials, unreliable results, original data not provided	912
Authorship issues	Ethical violations by author, copyright claims, false/forged authorship, conflict of interest, misconduct by author	603
Compromised peer review	Fake peer review, rogue editor	1655
Ethical issues	Lack of balance/ bias issues, Paper mills, legal reasons/threats, lack of ethics board approval	64
Falsification/ Fabrication	Falsification/ manipulation/ fabrication of data, images	172
Use of unconventional terms	Randomly generated text	453

We found that plagiarism (1690 publications) and compromised peer review (1655 publications) are the most prevalent causes for retractions, together accounting for the majority of cases. Plagiarism includes duplication, referencing concerns, and image misuse, while compromised peer review includes fake reviews and editor misconduct. Error and unreliable results (912 publications) and authorship issues (603 publications) are also significant, indicating the prevalence of poor research methods and ethical violations. Other notable reasons include falsification or fabrication of data (172 publications) and the use of unconventional, randomly generated text (453 publications). The total number of publications exceeds 3162 as majority of articles had been retracted due to multiple reasons. This distribution aligns with previous studies that have highlighted plagiarism and compromised peer review as the leading causes of retraction. For instance,[30-31] noted that the integrity of the peer review process and ethical lapses are central challenges to scholarly publishing. Thus, it is clear that despite increasing efforts to raise awareness about plagiarism and duplication among researchers and editors, the issue remains far from resolved. It is evident that educating researchers from scientifically developing nations on the implications of retraction due to plagiarism and duplication is crucial. Partnerships between seasoned editors, universities, and scientific organisations can play a key role in addressing this issue. Additionally, the promotion of awareness through webinars and training programs could greatly encourage adherence to ethical research practices.

6. LIMITATIONS OF THE STUDY

While this study provides a comprehensive analysis of retractions in Indian science over the past three decades, it is not without certain limitations that must be acknowledged. One limitation of this study is its reliance on data from the Web of Science, which may not capture all retracted articles, particularly those from non-indexed or regional journals. Additionally, this analysis focuses primarily on the last three decades. Since scrutiny for retraction is a continuous process, many articles that are published in recent past, may yet be retracted in future years which will eventually increase the growth. The study also does not account for the varying retraction policies across journals or countries, which can influence the timing and reporting of retractions. Lastly, factors such as journal-specific editorial practices and institutional policies were not considered, which could impact the retraction patterns observed in the dataset.

7. CONCLUSION

This article shows the extent of retraction in Indian science by analysing articles indexed in WoS since last three decades. We observed the rate of retraction increases with increase in number of publications in the last three decades. However, publications with bigger team size reduce the retraction rate as articles by 2 authors have 677 retractions but articles by 7 authors have 259 retractions. This study found that subjects and ideas with concurrent origin have a greater retraction rate than traditional subjects. Apoptosis, Internet of Things (IOT), machine learning, nanoscience are few such subjects where the rate of retraction is much higher than subjects like physics, psychology or biology. Impact factor is a reasonable surrogate measures for understanding quality of journal as high IF journals follow rigorous peer-scrutiny before publishing. However, it was seen that the rate of retracted articles does not necessarily decrease with increase of impact factor. Therefore, greater scrutiny of high-profile publications does not have an impact on retraction. The analysis also reveals that plagiarism and compromised peer review are the leading causes of retraction, highlighting significant concerns about academic integrity and the peer review system. Errors in research methodology and ethical misconduct by authors are significant factors leading to retractions, underscoring the importance of stronger regulatory frameworks and improved research practices. Addressing these issues is crucial to improving the quality and reliability of published scientific work. This study's findings highlight the need for greater awareness and proactive measures within the academic community to address the factors driving retractions, especially in emerging research fields. By highlighting areas where ethical lapses and methodological errors are more prevalent, this research can aid institutions, researchers, and journal editors in implementing targeted strategies for improving research integrity. Ultimately, these insights aim to foster a culture of accountability and rigor in Indian science, helping to uphold the credibility and trustworthiness of scholarly publications.

Building on the findings of this study, future research should delve deeper into understanding the underlying causes of retraction, particularly in emerging fields like nanoscience, machine learning, and the Internet of Things, which show higher retraction rates. Better understanding of underlying cause may potentially improve the culture of science. Further investigations could explore the role of institutional policies and funding sources in mitigating ethical misconduct and improving research integrity. Comparative studies across countries with similar publication growth patterns would also provide valuable insights into how global practices influence retraction rates. Additionally, future research should focus on developing predictive models to identify high-risk publications prone to retraction based on specific criteria such as team size, subject matter, or journal impact factor. Longitudinal studies could track the trajectory of retraction trends in newly emerging scientific disciplines, offering early interventions to address problematic research practices. Expanding the scope beyond the Web of Science to include regional journals may also offer a more nuanced understanding of retraction trends in Indian science.

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CONTRIBUTORS

Prof. Bhaskar Mukherjee PhD is the Professor of the Department of Library and Information Science, and working member of Malaviya Moolya Anusheelan Kendra, BHU, Varanasi, India. His research interests are: Scientometrics, Open access, Journal evaluation techniques, Information storage and retrieval, Knowledge organisation, etc.
He conceptualised the idea, collected and analysed the data in the present form. As per reviewers comments he also review of the paper.

Ms. Priya Tiwari is a Junior Research Scholar in the Department of Library and Information Science, Banaras Hindu University, Varanasi, India. His areas of research interest include: Open data, Digital humanities and Digital libraries.
She has organised, and processed the data for this paper and engaged in writing this article.