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Analysing Retraction Notices of Scholarly Journals: A Study

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ABSTRACT

Information and communication technology (ICT) is not an unalloyed advantage when talking about propagation and expansion of scholarly knowledge. The same ICT which acts as an enabler to research in the comfort of one's study and preferred environment makes the researchers with weak conscience vulnerable to the temptation of research misconduct. Surprisingly, the same technology acts as a sentinel, helping academe nail such transgressions and withdrawing them or taking the contextual corrective recourse. Of late, there has been a substantial increase in the invalidation and withdrawal of research articles based on invalid data and findings. One analysed the retraction notices of 249 annulled articles, indexed in Scopus, during the period, 2000-2017. The study has highlighted that the majority of the retracted notices do not have explicit reasons for revoking the findings of research articles. It has stressed upon the immensely pivotal role of libraries in spreading awareness and sensitising researchers with regard to adherence to norms, ethics and policies of scholarly communication.

Keywords: Retraction; Misconduct; Fabrication; Scholarly journals; Plagiarism; Research; False data

1. INTRODUCTION

Journals are primary carriers of novel findings of research. They bring out to the world the knowledge created by research conducted in individual departments and laboratories across the globe. The published research acts as stepping stone, accessed and consulted by the present and future generations of researchers to develop, evolve and further build upon it to synthesise and generate new ideas and research and most significantly solutions to many challenges faced by the society. Scholarly journals strive hard to meticulously propagate scholarly knowledge to society by employing rigorous process of selection, review, lengthy and stringent vetting of research manuscripts before these are published. In the same construction, these beget the authors the brownie points of the much prised scholarly visibility, fame and increased influence in the academe. Undeniably that is all very well deserved and righteous. The journals demolish the geographical barriers and silos of knowledge, connecting and bringing together the knowledge seeking researchers and intelligentsia for a greater cause of mankind. This meticulousness, diligence and extensiveness of efforts that underlies real research has unparalleled impact. The general and scholarly public have high trust in the published research and authors are held in high esteem. This is popularly known as credibility of science.

Unfortunately, this trust is also breached and infringed by the unscrupulous researchers who temptingly get sucked into the vortex of research misconduct. It refers to the acts of omissions and commissions, infraction of ethics, integrity, and norms of scholarly communication, plagiarism, deliberate or inadvertent use of falsified or fabricated data, misreporting research or selective reporting as per convenience/preference, data fraud. In fact, transparency and openness of research implies that all the null findings and statistically significant findings should be made available to the readers. But in reality, only statistical findings are reported and others are rarely published[1].

It is very pertinent to mention that plagiarism in higher education is a serious issue in the country. UGC, India has approved the draft of Promotion of Academic Integrity of Plagiarism in Higher Education Institutions Regulations, 2018. The same will be notified after approval of Ministry of Human Resource Development. It clearly mentions that the similarity of content in research beyond 10 per cent would invite penalty for researchers and faculty members. The penalty for faculty members may range from denial of rights to supervise students at various levels, Masters, M. Phil and Ph.D. for two years to suspension or dismissal from services[2].

Non-adherence to norms of research communication results in inhibited growth of progressive knowledge and impedes development of reflective thinking in students and researchers[3]. Misconduct in research leads to dissipation of energy, time and money of entire fraternity of research scholars. The scholarly damage increases when erroneous study becomes the base and reference point for further studies. This domino effect will

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continue till someone notices erroneous study and publisher/ author issues notice of withdrawal of the same. Whenever any kind of infraction in research norms emerges, the editors and authors minimise the damage by withdrawing tainted published paper immediately and this process of withdrawal is known as retraction. Sometimes authors may self-decide to retract their articles and communicate the same to the editors. The Committee on Publication Ethics (COPE) Code of Conduct for editors (published in 2003) holds editors of journals responsible for authenticity of information published in their journals. They should readily publish corrections, clarifications, retraction notices and apologies as per the need of the situation[4].

The Paper analyses the content of retraction notices of retracted articles as indexed in Scopus. It is pertinent to mention here that retracted articles are listed as one of the types of documents in Scopus. The study talks about published research articles which have been retracted since 2000. It spotlights the issue of retraction together with the reasons which led to annulment of the same. Also it sounds them of ways of steering clear of such fumbling/lapses, either intentional or unwitting, as it may cost them their scholarly aura and dilute the credibility and efficacy of their works.

2. LITERATURE REVIEW

The number of retractions has gone up from 97 in 2006 to 664 in 2016. The Scientist magazine has reported ten main retractions of 2017. It also refers to two articles written by Nobel prize winners in Science and Nature Chemistry in 2014 and 2016 respectively. The Nobel laureates got their papers withdrawn because their laboratories could not replicate the findings which they reported in their research. Tumor Biology journal revoked 107 papers in one go after it was learnt that the review process had been compromised[5].

A former British surgeon and medical researcher published an article in the reputed journal Lancet in 1998 which established a link in Measles, Mumps and Rubella (MMR) vaccine and a new syndrome of autism and bowel disease". Doctors across the globe raised voice against compulsory MMR vaccination. It was discovered in 2012, after a gap of 14 year, that this study was based on fabricated and false data consequently it was retracted, but by then it had received many citations and had been consulted by thousands of medical doctors. The fraud research led to declining in vaccination of thousands of children; it made innocent children vulnerable to diseases like measles and mumps and created distrust among the general public against immunisation[6]. It highlights the enormity of damage which can be caused by fraudulent research. The research findings in manipulated studies are fabricated, biased and driven by ideas and feeling of authors of studies and may be harmful[7]. Williams & Wager[8] advised editorial boards of journals to be cautious in differentiating between genuine errors and misconducts; this study further cautioned journals to be careful in dealing with research misconduct as a slight mistake on the part of the journals may lead to permanent damage to reputation and career of authors.

Further damage can be stopped by immediate withdrawal of controversial publication. The removal of controversial published articles in subsequent issues is termed as retraction; it may be due to infringement of professional ethical code, such as multiple submissions, bogus claims of authorship, plagiarism, and fraudulent use of data. The articles are being rescinded at an increasing rate across all the subject areas[9]. A retraction notice is issued by the editor of the journal to alert the readers about an article which is no longer valid as it violates professional research ethical code. Hence retraction is treated as a correct measure to avoid further damage due to erroneous publication[10]. The reasons stated behind retraction in the notice may be honest errors, non-replication of research findings, misconduct etc. Scopus citation index has flagged 249 publications as retracted since 2000. The exact prevalence plused of flawed and manipulated research is unknown, but it is likely to be higher than the current rate of retraction. Retraction Watch is a blog which keeps track of retracted articles and reports about them on web link http://retractionwatch.com/. It has been observed that the higher the impact factor of the journal, the more retractions are reported due to fraud[11]. The journals like Cell, Lancet, PLOS ONE, Nature, New England Journal of Science reported have high retraction rates[12,13] have reported that 65 per cent of the top 200 scientific journals have retraction policies, however there is lack of consistency in policies and practices of retraction. Thus the corrective measures of retraction of research articles differ with changes in retraction policies of publishers. The corrective measures are also influenced by reasons behind retraction; extent of scholarly and humanitarian damage; the policy of publishers, consent of co-authors and legality involved in revocation. The retraction process consists in linking of retraction notice with the initially published article; explaining reasons for retraction, however, few retraction notices fail to state reasons behind withdrawals. The notice further states the date of withdrawal and link to full incorrect version. There are instances when the withdrawn paper is replaced by the correct version, while some publishers retain the original article unchanged, in such scenario publishers may watermark the full-text of the retracted article as retracted; while HTML version may be removed. In rare cases, where legal reasons are involved, the full text is deleted. The abstracting and citation databases also highlight retracted articles. The Web of Science (WOS) has "retracted publication" as a category of documents. Medline also highlights retracted papers.

The anti-plagiarism software highlights merely where the texts match with already published works, so this software cannot replace human intelligence. Ultimately editorial teams of journals have to take the final call and decide if contents of the submission are plagiarsed or otherwise. Fanelli[14] has observed that retractions are rising not because of increasing research misconduct but due to the reason that the researchers have become more aware, educated and vigilant and raise voice against the erroneous, falsified, fabricated and misreported research. Baker[15] endorsed responsibility of libraries in promoting awareness about the retraction notices to minimise the scholarly loss in future.

Many governments across the globe extend incentives to the researchers for publishing in international journals[16]. The researchers are under pressure to publish as their grants and promotions are linked to the number of research articles they

publish in high impact, international journals. So in a bid to amass numbers, the basic norms of openness, reproducibility, transparency, which the researchers are strictly supposed to adhere to, are relegated[17] have advocated that the authorities should provide incentives to researchers for practicing ethics and integrity. The scholars should be awarded for publishing proper research and not publishing more research[17] have observed that the word "retraction" has an insinuation of pessimism or utter dismissal, as it refers to an annulment of research both for inadvertent as well as for the deliberate misconduct. The researchers may want to withdraw their work when they discover some errors which they committed, though they had a clear conscience; while there may be instances where researchers deliberately submit and publish flawed research and withdraw under pressure. The use of other terms like "Voluntary withdrawal" and "withdrawal for cause" may remove the deep stigma associated with the term of "retraction".

Research productivity enhances careers and bestows accolades and esteem. Research findings are supposed to extend the existing boundaries of knowledge and support and promote the humankind, be it food, security, harnessing the potential of natural resources, reducing the drudgery of the day-today mundane life, protection from environmental and natural calamities. Unfortunately, this is not always true because of wrong conduct of researchers, this lead to retraction.

2.1 Objectives of the Study

- To highlight retracted articles during 2000-2017, indexed in Scopus
- To understand reasons behind retraction, with the help of content analysis of texts of retraction notices
- To assess extent of scholarly damage caused by retracted articles by counting citations received by such articles
- To identify subjects which reported frequent retractions

3. METHODOLOGY

This is an exploratory study which used quantitative as well as qualitative research methodologies to meet the aforementioned objectives. The quantitative research approach is based on descriptive statistical techniques to understand frequency and trends in retractions across disciplines and individual journals The qualitative research is applied to understand reasons behind retraction; it is based on analysis of texts of retraction notices. The content analysis is based on meaning of the notices rather on patterns of texts/phrases in notices.

Secondary data for the study was obtained from Scopus's abstracting and citation database of peer reviewed literature of scholarly journals, books and conference volumes. Retracted articles are listed as one of the types of documents in Scopus database. The data for the study was downloaded in the second half of January 2018.The following filters were set up for retrieval of data for the study.

- Document Search-English Language
- Time: 2000-2017 (years inclusive)
- Document type: All

This search showed 3,09,84,745 record. Out of these, 249 were retracted documents. These were downloaded and analysed for the present study.

4. DATA ANALYSIS AND FINDINGS

249 articles were retracted from 161 unique scholarly journals during the 18-year period, 2000-2017. Trends of retraction are reflected in Table 1 through number of articles retracted annually.

Journals and research community have become more vigilant against research misconduct in recent years; the results show that over 50 per cent of article were retracted in the last three years. Internet technology helps in easy access and retrieval of information. At the same time, it offers counter tools in parallel, which help in easy detection of plagiarsed and copied text.

Table 1. Numbers of articles retracted annually

Year	Articles	% of total	Cumulative %
2017	19	7.6	7.6
2016	57	22.9	30.5
2015	49	19.7	50.2
2014	41	16.5	66.7
2013	17	6.8	73.5
2012	20	8.0	81.5
2011	13	5.2	86.7
2010	9	3.6	90.4
2009	6	2.4	92.8
2008	1	0.4	93.2
2007	6	2.4	95.6
2006	5	2.0	97.6
2000-2005*	6	2.4	100.0
Total	249		

**1 research article in each year*

4.1 Authorship Pattern and Retraction

Paper produced by research teams include names of each member of the team as authors as per their contributions in conducting research and writing the research findings in the form of publication. The Table 2 expresses descriptive association in numbers of authors with chances of withdrawal of research paper.

Table 2 has proved that multi-authored papers are retracted more than the single author papers. 94.8 per cent of retraced articles were multi-authored. The experts[18] analysed 19.9 million article and 2.1 million patent, reported that more research is being done in collaboration in different fields like Sciences and Engineering, Social Sciences, Arts and the Humanities, unlike in the past, when solo authors dominated the scholarly communication landscape[19] have explained authorship trends in bioinformatics discipline and reported that 9.8 per cent of articles are single authored and 90.2 per cent are multi-authored. This may be rationale for very high retraction

of multi-authored papers.

Many retraction notices mentioned that co-authors' names were used without seeking their permission. The researchers must be aware that they must formally seek permission before putting their colleagues' names as co-authors. Besides, it is unethical to put others' names as co authors, when such authors have not contributed to the paper. The issues of ghost and gift authorship are widespread in the scholarly communication landscape. The STEM publishers have given some rules for authorship which are not uniform or consistently followed by researchers.

Table 2. Number of authors of retracted articles

Year of publication	No of articles Retracted	Single Author	Multiple authors
2017	19	1	18
2016	57	3	54
2015	49	5	44
2014	41		41
2013	17		17
2012	20	1	19
2011	13	1	12
2010	09	1	08
2009	06		06
2008	01		01
2007	06		06
2006	05		05
2005	01		01
2004	01	1	
2000-2003*	04		4
Total (2000 – 2017)	249	13	236

*1 research article in each year

4.2 Journals in which the Articles were Published

There were 160 unique journals which retracted 249 articles. Table 3 has listed five journals with the highest number of retracted articles along with their Impact Factors in brackets.

Table 4 reflects that journals with high number of retraction papers also have high Impact Factor. All the journals with high retraction rate are in the discipline of Biology, Bio-medical and Nature Sciences; all these disciplines are closely associated and have great impact on human health and humanity

4.3 Number of Citations Received by the Articles before these are Withdrawn

Citations indicate that the citing researchers have referred the cited research to consult and build up their work. Each citation to an article, with invalid findings, adds to scholarly damage, so the number of citations to articles, with erroneous results, is an important parameter to estimate harm caused by false or untrue research article before it is s withdrawn. The 249 retracted articles received 4909 citations; 10 item out of these had remarkably high 2202 citations. It implies that retracted articles caused grave damage to scholarly world and society by misleading other researchers over 4909 research studies. The exact extent of damage will be more as errors of incorrect research articles have been further propagated and built upon by others who have referred these 4909 studies.

Table 3. Name of journals with highest numbers of retraced articles

Name of the journal	Number of articles (Impact factor)
Tumor Biology	15 (2.926)
PLOS ONE	10 (2.806)
Biomedical Research International	06 (2.476)
Journal of Biological Chemistry	06 (4.125)
Nature Communication	06 (12.124)
Others	206

Table 4. Reason behind retraction of published article

Reason category	Reasons for retraction	No of retracted papers
Honest error	calculation error/ inaccurate data	1
	Technical error	1
	Repeated attempt for publication	1
Plagiarism	High degree of overlap, failure to give credit to the original source	1
	Image/ figure	1
	Fabricated trial clinical data	1
Ethical problems with research	Name was used without permission Lack of ownership of data	2
	Inaccurate/misleading reporting	1
No reason/ unclear		240
Total retracted articles		249

4.4 Reasons of Retraction

Contents analysis of retraction notice was done to understand reasons behind retraction of article. The content analysis is based on meaning of retraction notice. Reasons for retraction are classified into three categories i.e. a) Honest error b) Plagiarism and c) ethical problems

The major findings while doing content analysis of retracted notices are as follows

- The articles were either retracted by authors or editors in collaboration

- Majority of the articles did not have explicit explanation for retraction
- Few articles were retracted as their authors had used inaccurate, fabricated clinical data, although authors did not have ownership of data used in the articles. Authors committed inadvertent error; in handling and using data
- There were journals which published expression of concern before retracting the articles. For instance, an article was published in 2000 in Glia. The journal published expression of concern to notify readers about the validity of data and this was being investigated by national level committee on scientific dishonesty. In 2017 the article was retracted as the committee found that there were discrepancies in the type and number of animals used in experiments and thus the findings of the study were unreliable
- Similarly, Diabetes journal published an article in 2006 and issued expression of concern in 2015 to alert readers about the reliability of data. The readers complained to the editor of the journal that the article had duplicate and manipulated images. The main author's institute was asked to investigate the matter and the article was withdrawn in 2016.

4.5 Subject Categories of Retracted Articles

The study analysed whether tendency of research misconduct differed with discipline. Retracted articles are classified discipline wise as shown in Table 5. Name of discipline of research paper is mentioned in the database of the Scopus citation index.

The maximum numbers of retraction of articles in the last 18 years were in Medicine, Health sciences, Orthopedics and Oncology disciplines, 39.4 per cent of retracted articles were these discipline; it is followed by retractions in Bioscience, Pharmaceutical sciences, Biotechnology, Biosciences or Neurobiology with 16.5 per cent of retracted articles were these discipline. All these disciplines are closely associated with human health, so research misconduct in these disciplines lead to deleterious permanent damages to humankind and society.

4.6 Role of Libraries

Libraries in collaboration with teachers can play a proactive role in sensitising researchers about academic misconduct. Libraries should hold awareness/sensitisation sessions on academic conduct, ethics and integrity in research, the concept of retraction should also be dwelt upon. The retracted articles along with reasons behind withdrawals should be highlighted in sensitisation programme. Libraries should educate the researchers on different aspects of data organisation, management and storage for easy access and retrieval for reliable and correct data. Best practices in data management practices should be documented and shared with researchers. Libraries should formulate rules and guidelines to ensure compliance of ethics and norms in research, the policy will also postulate procedure to identify and deal with research misconduct. Libraries should educate the researchers on different aspects of data organisation, management and storage for easy access and retrieval for reliable and correct data. Best practices in data management practices should be documented and shared with researchers. Libraries should formulate rules and guidelines to ensure compliance of ethics and norms in research, the policy will also postulate procedure to identify and deal with research misconduct. A culture of honesty and transparency, ethics in academic and research environment should be emphasised upon.

Quality of research, not quantity, should be spotlighted, emphasised and celebrated. Besides providing guidance and training, authorities should deploy additional measures like scrutiny and monitoring, random auditing of research findings.

The teaching and research system needs to be overhauled. Efforts need to be implemented to ensure that research endeavors which are undertaken have impact and relevance for the masses.

Research advances scientific knowledge and impacts humankind. But it should not be linked to promotions or career advancement. The pressure to publish compels teachers to priorities research over their essential duties and responsibilities. It may be a little impractical for teachers in medical colleges and institutions as they are supposed to teach and attend to the healthcare needs of the society. But when the professionals

Table 5. Discipline of the retracted articles

Subject category	Articles	% of total	Cumulative %
Medicine /Health sciences/ Orthopedics/ Oncology	98	39.4	39.4
Bioscience/Pharmaceutical sciences/Biotechnology/ Biosciences/Neurobiology	41	16.5	55.9
Engineering/Nanotechnology	32	12.9	68.7
Petroleum/Chemistry	19	7.6	76.3
Physics	16	6.4	82.8
Information/Computer/ Communication Engineering	14	5.6	88.4
Environment and Resources science/Ecology/ Fishery	8	3.2	91.6
Mathematics	5	2.0	93.6
Geology	4	1.6	95.2
Nutrition and Food Management	4	1.6	96.8
Veterinary sciences	3	1.2	98.0
Education	2	0.8	98.8
Orthodontics	2	0.8	99.6
Material sciences	1	0.4	100.0
Total	249		

are under pressure to publish, they have no qualms and get published in predatory journals. Most of the submissions in predatory journals are from India. Robust infrastructure, with facilities for research along with supportive attitude and congeniality of the entire academic and research ecosystem should be cultivated and extended.

Besides, there should be two types of categories of institutions like teaching universities and research universities across all the streams, STEM, and SSH. On group should focus on teaching and mentoring students while another should be into conducting research and generating innovations and new knowledge for application by the masses.

Undeniably, research connects the dots offered by contemporary knowledge and analyses the same to create more, thus helps to get the needed insights or way ahead. The need of the hour is to have an arrangement of a twin set up. One wing should create knowledge-this is the one with strong research inclination and bandwidth working closely with the one that works with the application of the generated knowledge and executes the use of the same effectively. None of the two can exist meaningfully in isolation. But equally crucial is the role of experts or professionals who have exceptional expertise in the application and execution part of the same. And these experts should not be under any obligation to produce a required number of papers. Particularly fields like management, marketing, health sciences, agricultural sciences, renewable energy, need both.

Transparency and openness of research implies that all the null findings and statistically significant findings should be made available to the readers. But in reality, only statistical findings are reported and others are rarely published[1]. The researchers must know that the journals' policies emphasise on providing open access to raw data on which the published manuscripts are based upon; otherwise, they may risk getting their articles retracted. The retraction notice given as Annexure A highlights the importance of saving raw date even after publishing of article.

The researchers should be taught about the referencing skills, as lack of these skills may result in their articles getting retracted.

5. CONCLUSION

The study has analysed retraction notices of 249 article indexed in Scopus, in the last 18 year, i.e. 2000 -2017. Health sciences had maximum number of retractions. Journals have increasingly become alert and sensitive to research misconduct over the recent years; over 50 per cent of retracted articles were withdrawn in the last three year. The availability of anti-plagiarism software coupled with the growing awareness among all the stakeholders of knowledge has contributed to the cause. The study also brings forth the lack of uniformity in the retraction polices. Also it discusses the lack of clarity on reasons quoted for retractions. The study noted that 95per cent of retracted articles were multi-authored. One of the prime reasons for withdrawal of paper was that one of the authors reported that her/his name was included without seeking her/his consent.

Libraries need to evangelise among the researchers the rewards and prestige tagged with good research and caution them against defame and fallout of non–adherence to norms or ethics of scholarly communication. Ensuring the credibility and integrity of research activities and published literature is the joint responsibility of all stakeholders-researchers, supervisors, universities, funding bodies, editorial boards and publishers. They must ensure strict compliance to the relevant policies in this context. Research to be impactful has to safeguard the sacrosanctity of the efforts that go into it.

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