Research and Publication Ethics

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ABSTRACT

The recent surge in India's scientific output, and the publication-driven authors' careers have together eroded the focus on ethical conduct in scientific practices. Consequently, there has been a significant rise in allegations of misconduct and retractions of papers from India. According to the US Office of Research Integrity (ORI), scientific misconduct essentially includes 'fabrication, falsification, or plagiarism in proposing, conducting, or reporting research'. Unlike developed countries, India does not have a system of scientific policing that includes empowered regulatory bodies, well defined procedures for investigations, vigilance towards fraudulent scientific practices and awareness about basic codes of ethical scientific conduct. The Indian government, universities and research organizations should come together and frame laws that would not only keep vigil on the ethical legitimacy of scientific publications but also initiate appropriate punitive actions whenever there is a breach of scientific ethics. This article discusses the various aspects of scientific misconduct including the different definitions, interpretations, procedures for investigation and strategies for implementing a comprehensive system for investigating scientific misconduct and minimizing malpractices in the rapidly expanding arena of Indian scientific enterprise.

Keywords: Scientific misconduct, ethics, fabrication, falsification, plagiarism.

BACKGROUND

There has been a significant spurt in Indian scientific research after two decades of lull. India's sudden growth has fueled substantial bibliometric evaluations by various premier publishing houses such as Elsevier.[1] Findings of the latest bibliometric study on Department of Science and Technology, India, published by Thompson Reuters, draws attention towards the increasing number of scientific publications since beginning of the 21st century.[2] India is ranked 9th in the world with respect to publications indexed by the Science citation index.[2–4] According to this report, the period between 2001 and 2007 witnessed a 30% growth in publications rising from nearly 17,000 to more than 27,000 articles.[3,5]

It is however disappointing that this phenomenal growth is marred by a simultaneous rise in withdrawals and allegations of misconduct. Last year, the Deccan Herald reported that India tops in academic fraud.[6] Incidence of misconduct has risen from 10 per 100,000 during 1991–2000 to 44 per 100,000 manuscripts published during 2001–2010. Analyses posted on the *Nature* blog regarding the incidence of retractions per 100,000 papers, show that India has the highest fraud rate in the world (18 publications); far higher than those for China (11), South Korea (9), the US (5), Japan (5), the UK (2), and Germany (1). Scientific misconduct is drawing abundant media attention and internet publicity. Even VIPs, celebrities and innocent bystanders are being dragged into controversies surrounding misconduct.

A recent study on retractions revealed that during the period between 2001 and 2010, 70 of 103,434 papers published from India have been retracted.[6] Scientists from some of the best institutes in the country were involved. Among the accused are reputed organizations such as Council of Scientific & Industrial Research (CSIR), Department of Biotechnology (DBT), Banaras Hindu University (BHU), Postgraduate Institute

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for Medical Education and Research (PGIMER) and IIT-Kanpur.[6] Of the 69 retracted papers, 45 were attributed to some form of plagiarism such as text plagiarism, self-plagiarism, and data plagiarism. Retracted papers from India involved over 130 authors among which 12 authors involved in at least three (overlapping) retractions due to misconduct.[6]

Scientific misconduct has been attracting so much international attention that even high impact factor journals such as *Proceedings of the National Academy of Sciences (PNAS)* are devoting space for publishing full-fledged research papers on scientific misconduct. In one such study, Casadevall and coworkers showed that 2,047 PubMed articles were retracted from a total of 25 million articles published since 1940s. While 21.3% retractions in life science were because of 'honest' errors, as much as 67.4% were the result of misconduct, chiefly plagiarism and duplication.[7] There has been a marked rise in retraction since 2005 due to plagiarism, tampering images, error and suspected fraud (including falsification, and fabrication).[8] Another recent study showed a ten-fold increase in retractions due to fraud since 1975.[9] High impact factor journals such as *Nature*, *Science*, *PNAS* and *Cell* have been victimized, in spite of rigorous peer review.

In a survey, published in *British Medical Journal (BMJ)*, which included 2,800 doctors and medical academics, 13% had first-hand knowledge of someone "inappropriately adjusting, excluding, altering or fabricating data".[10] Except for plagiarism, journals cannot spot cheaters, rendering investigation very tricky. Libel laws prevent journals from even flagging "proven cases of misconduct". Universities and institutions are not always forthcoming in investigating cases on their own. U.S. Office of Research Integrity (ORI) can block funding, but cannot investigate without help from the concerned universities, institutes, etc. Journals have neither the power nor financial resources to investigate on their own and universities can simply refuse to cooperate. *BMJ* reported that 6% of respondents knew that misconduct is not being properly investigated by institutions.[11] Instances of misconduct are particularly high in developing countries. It is unfortunate that the developing world makes news only when things go wrong.[12]

India has no systems in place for investigating scientific misconduct. We need laws that compel universities to investigate or initiate third-party investigations.[13] Indian scientists are calling for a system that functions like ORI, which can proactively detect, investigate, and punish proven scientific misconduct in the country. This office is envisaged to be part of a national policy on academic ethics, catering to the country's rapidly expanding scientific community and publication output. In this connection, it is important to create awareness on this rather embarrassing issue, particularly among the young and naïve researchers in India.

DIRECT AND INDIRECT IMPACT OF SCIENTIFIC MISCONDUCT ON THE SOCIETY

Scientific misconduct results when researchers' bias fails to link appropriate answers to novel research questions. Bias comes from external and internal pressures that selectively promote the publication of positive results that please sponsors or authors. Apart from destroying the quality of science and the values that guide the ethical quest for truth, scientific misconduct can also critically influence both public policies and the interests of the society. Thus, scientific misconduct inflicts a great deal of moral, legal, social and financial burden upon humanity.

Scientific misconduct raises several questions on the values practiced in science. Not only does it destroy faith in the scientist, but it also creates a pernicious hierarchy led by fraudsters. Fraudulent mentors perpetuate a tradition of misconduct in their protégés. The reputation of the institution, to which such fraudsters are affiliated, is also at stake. Honest scientists often relocate to better labs, or stay isolated from the mainstream. For instance, many distinguished Romanian Scientists fled to other countries when the scientists of their country got mired in multiple controversies.

Does scientific misconduct violate law? Only sometimes, depending on the legislation specific to a given country. Mostly it destroys the career of the offender. Hwang Woo Suk, a South Korean researcher, who earned substantial notoriety for fabricating a series of experiments featured in high impact factor journals, was dismissed from the Seoul National University in March 2006.[14] David Baltimore, an American biologist, and Nobel Laureate in Physiology or Medicine resigned from his presidency of Rockefeller University, saying that he could no longer be an effective leader because of the controversy over his role in a case of misconduct. Sometimes the guilty is forgiven and reinstated. The French community of geologists rehabilitated Jacques Deprat who was accused in 1919, which is a rare event in history.

Another major concern is the cost of investigating scientific misconduct. A single investigation on research misconduct at Roswell Park Cancer Institute, Buffalo, NY, USA, costed about $525,000 (₹27,800,000).[15,16] Salaries for witnesses and investigators were $512,000 and clerical support cost $2,500. Another $10,000 was spent on support staff serving security, information technology and forensic computer expertise. Thus, the

total cost for 217 such cases of misconduct reported in that year would have amounted to $110 million (₹5.8 billion).[15]

Fake data, unfair peer review, ill-treatment of animals/human subjects, disagreement on authorship/ownership and the social costs of misleading campaigns are among the many forms of misconduct. *Lancet* published a paper in 1998 linking MMR vaccine and autism. The paper was subsequently discredited and the fraud exposed, but not before the damage was done. This very influential paper had already brought down the rate of MMR vaccinations to dangerously low levels.

DEFINITION AND NATURE OF SCIENTIFIC MISCONDUCT

Scientific misconduct is the violation of the standard codes of scholarly conduct and ethical behavior in scientific research. Different countries have different ways of interpreting scientific misconduct. The Swedes define scientific misconduct as "Intentional distortion of research by fabrication of data, text, hypothesis, or methods from another researcher's manuscript or publication; or distortion of the research process in other ways".[17] In the Netherlands, scientific misconduct is defined as "Intentional or gross negligence leading to fabrication of the scientific message or a false credit or emphasis given to a scientist".[17] Gross negligence, understandably, is tantamount to violation of standard code of scholarly conduct.

Misconduct may be in the form of fabrication (making up data and publishing them), falsification (manipulation of research data and processes or omitting critical data or results), plagiarism (taking credit or attempting to take credit for the work of another) and inappropriate citation. Willful failure or negligence in crediting prior discoverers can give an improper impression of priority to a paper. Failure to cite relevant previous work is also called 'citation amnesia', 'disregard syndrome' and 'bibliographic negligence'. It is sometimes difficult to establish whether authors deliberately ignored such papers or failed to spot them. Sometimes this could also be due to the word limit set by journals.

Violation of ethical standards regarding human and animal experiments, deficiency in informed consent and gift authorship/guest authorship are also instances of misconduct. Another classic type of scientific misconduct is ghost writing, where someone other than the named author(s) makes a major contribution. Typically, this disguises the contributions from drug companies, includes plagiarism and has an element of financial fraud.

CLASSIC CASES OF SCIENTIFIC MISCONDUCT

It would be impossible to discuss cases of misconduct of every category. However, a brief account on such cases can teach us the various complexities associated with the interpretation and investigation of scientific misconduct.

Plagiarism and data fabrication

The case involving Prof. B.S. Rajput, the then Vice Chancellor, of Kumaun University, Nainital, Uttarakhand, illustrates how high handed superiors can challenge ethical norms with impunity.[18] It all started in 2002, when a group of Indian physicists accused Prof. Rajput, on a website, saying that some of his papers claimed authorship for previously published work. The website alleged that a paper by Joshi and Rajput in *Europhysics Letters* was entirely copied from a paper by Dr. R. Kallosh (Stanford University, Stanford, CA, USA). Rajput threatened legal action against the whistle blowers and suspended Kavita Pandey, Head, Department of Physics, Kumaun University, for publicizing acts of plagiarism by Rajput and his associates. In October 2002, seven physicists, including Nobel laureates and Kallosh, wrote to the President of India, Dr. A.P.J. Abdul Kalam, requesting an investigation into the matter and the reinstatement of Pandey. The appeal to Kalam is a situation peculiar to countries like India, which have neither a definite legal redressal system nor a procedure for initiating investigation against scientific misconduct. President Kalam asked the Governor of Uttarakhand to conduct an enquiry. The Governor appointed a committee headed by a retired judge with reputed professors as members. Rajput maintained that plagiarism was a result of the student publishing the paper without his consent. The committee upheld plagiarism charges after an enquiry and Rajput was forced to resign.

Another well-known case was that of Prof. Ram B. Singh, a private practitioner from Moradabad, Uttar Pradesh.[19] He published 25 clinical research trials/case-control studies during the period between 1990 and 1994. Unrealistically high publication rates raised suspicion of research misconduct among the scientific fraternity. In addition, a journal referee reported a remarkable similarity between a 1993 *BMJ* paper and an earlier peer-reviewed paper. The case was too hot to ignore, but the question was who will investigate? Prof. Evans, statistics advisor to *BMJ*, took the lead and asked Singh for raw data. Singh sent plenty of unrealistic data; for example, standard deviations of dietary intake were unusually low. Undeterred by the on-going investigations, Singh submitted his next manuscript to *BMJ*. Prof. Evans found considerable discrepancies and *BMJ* approached the Committee on Publication Ethics (COPE) on a case

of suspected misconduct. Singh failed to answer queries and withdrew the paper. In 2000, they submitted the case to National Human Right Commission (NHRC) and NHRC referred it to Indian Council of Medical Research (ICMR). The lack of clarity on the policy in probing misconduct is amply illustrated by the convoluted procedure of investigation in India. Prof. Ganguly, the then Director of the ICMR said that ICMR cannot take disciplinary action against Singh and suggested that *BMJ* approach Medical Council of India. Scientific misconduct is mostly undebated in India and no national guidelines exist to check it.

An interesting case of alleged misconduct at the National Centre for Cell Science (NCCS), Pune, was featured in the Editorial of Current Science, 2007.[20] A pseudonymous email to the Director, NCCS, charged Rangaswami and colleagues of NCCS of reproducing a figure, with only the label changed, in *J. Biol. Chem., 2005*, which was lifted from one of their own papers published in *J. Biol. Chem.,* 2004. This case is an illustration of the misuse of image manipulation software, thanks to modern digital technology. Editors of *J. Biol. Chem.* conducted an independent enquiry and retracted the paper.

Another high profile case, an example of how media and political lobbies can step in, occurred in 2005, when the Indian government set up a committee of elite scientists to examine if Indian Patent Law amendments were TRIPS compliant. The committee reported that "Amendments were not TRIPS compliant, since Article 27 of TRIPS stated that no technology or field could be excluded from patenting as long as it met the basic criteria of novelty, non-obviousness and utility, whereas Indian Patent amendments meant only new chemical entities satisfying certain criteria could be patented." The committee was accused of plagiarism because the report included unattributed sections borrowed verbatim from an earlier paper. In a related development, political parties, some pharmaceutical industries and NGOs challenged the report. The Times of India and The Hindu reported this accusation of plagiarism. In 19 February 2007, the committee withdrew the report, while admitting flaws in it.

Ghost authorship

A paper in *PloS Medicine*, 2010, by Fugh-Berman, claimed 'journal articles drafted by medical writers downplayed risks of hormone replacement therapy (HRT)'.[21] Fugh-Berman's study focused on the drug company, Wyeth, which created DesignWrite (a company based in Princeton, New Jersey, USA, involved in scientific writing) helped the academic authors to pen articles on Prempro and HRT.[22] Between 1997 and 2003, Wyeth helped authors in the publication of dozens of peer-reviewed articles, abstracts and posters on HRT, for which the drug maker paid up to $25,000 per project. There is evidence for involvement in writing, editing and overseeing publications, with minimal involvement from the named authors.[22] Later, when the pharmaceutical giant Pfizer bought Wyeth, its spokesperson, Christopher Loder, disputed Fugh-Berman's conclusions. Loder stated that Fugh-Berman's analysis completely and conveniently ignored the fact that the manuscripts were subjected to rigorous peer review by outside experts on behalf of the medical journals that publish the articles.

Initiatives to investigate Prempro-like drugs claiming outcomes that are unrealistic and without any supporting clinical data, were taken only when some major lawsuits were filed against pharma giants. HRT with oestrogen and progesterone was promoted to ease symptoms of menopause and protect against heart disease and osteoporosis. However, the risk-benefit profile of HRT did not justify intervention.[23]

Gift authorship

In June 2005, a paper in *Science* listed Dr. Schatten, University of Pittsburg, USA, as the senior author. Due to concerns about the article, Dr. Schatten asked *Science* to retract his name, but the journal refused because the journal's rules required consent from all authors. Later in 2006, when data fabrication was discovered, Schatten was disgraced for not fulfilling the responsibilities of a co-author, even when he was not involved in data fabrication.

Research sabotage

Research sabotage adds a new dimension to scientific misconduct. The most talked about case of research sabotage was that by a post-doctoral candidate, Vipul Bhrigu of Michigan University, USA, who destroyed the work of a colleague, Heather Ames, by poisoning cell culture media and tampering with Western Blots.[24] Bhrigu's action was captured on a hidden camera, after which he confessed and blamed the hyper-competitive environment. According to the Washtenau Country Courthouse verdict, Bhrigu was asked to pay $8,800 for reagents and chemicals, $600 for court fee, 6 months' probation, and 40 hours community service. He was also recommended to undergo psychiatric evaluation. Bhrigu's supervisor appealed for a bigger punishment in which Bhrigu was asked to return his entire salary, pay half of Ame's salary plus 6 months' salary of a technician. Bhrigu fled to India before the next hearing.

Predatory online journals – a new brand of misconduct

While legitimate scientific journals cannot be blamed for inadvertently publishing fraudulent work, a new genre of

journals has emerged with the sole purpose of making money out of the mad rush for publication. Such journals, described as 'predatory online journals' by Jeffrey Beall, University of Colorado, USA, pay no attention to quality, content, peer review, etc. Beall has compiled a list of more than a hundred open-access journals that, for a small fee, will publish papers in ISSN-numbered journals, without any questions. (The list is available at http://scholarlyoa.com/publishers/).[25]

Open-access science databases, such as BioMed Central, expand the global access to latest research. Counterfeit journals also exploit open-access and practice the 'author pay model', in which the author fee is quoted after the authors surrender their copyright. Authors sometimes receive a bill as high as US $2,000 from journals with a dubious reputation. Predatory online journals are dishonest, non-transparent and frequently target young researchers. Their websites resemble legitimate online publishers, but are of low quality. Such journals may claim to be published from the USA, the UK, but often operate from third world countries.[26]

TACKLING SCIENTIFIC MISCONDUCT

With the number of cases of scientific misconduct steadily mounting in India, putting a check on such incidents is the greatest need of the hour. Vigilance, a major deterrent against prospective offenders, is improving with the implementation of preventive measures such as the 'Shodhganga' Scheme by University Grants Commission. Under this scheme, the 'Shodhganga' website uploads soft copies of Ph.D. theses, which can be scanned by anti-plagiarism software. Universities in Kerala have already queued up for joining the 'Shodhganga' scheme. University of Madras is preparing to use software to detect plagiarism. Jawaharlal Nehru Technological University (JNTU), Hyderabad, has adopted 'Turnitin' from iParadigms LLC, a plagiarism detecting software in use since 2009. "More than 30% similarity in scholarly articles will straightaway lead to rejection," said former Director, Research and Development, JNTU. Guideship will be cancelled, if found guilty, and offenders will not be awarded Ph.D. Bangalore University has put the ceiling on 20% duplication of content. "Ph.D. scholars plagiarising will be expelled," says Vice-chancellor, Delhi University. 'Turnitin' is gaining worldwide popularity. University of Queensland, Australia, has been using 'Turnitin' to detect plagiarism in students' assignments/dissertations, which are submitted compulsorily in electronic format.

Just introducing plagiarism detecting software is not enough because the problem of scientific misconduct is much deeper. Ethics must begin right from the 'bench-scientist'. As we move up the hierarchy, authors, co-authors, the academic/research institution, journals, editors, reviewers, and finally the publishers, who share a great moral responsibility toward communicating honest and authentic results, should be sensitised towards the problem of scientific misconduct.

RESPONSIBILITIES OF SCIENTIFIC FRATERNITY TOWARDS PREVENTING MISCONDUCT

Academics should be acquainted with the various precautions to be taken for preventing scientific misconduct. Science is a co-operative enterprise. Uncompromising personal integrity and collective vigilance towards potential free riders are effective pre-emptive strategies. It is important for every player to be familiar with the guidelines for ensuring a transparent and honest system in the scientific enterprise. The most important among them are discussed below.

Bench-scientists' responsibilities

Proactive steps: Bench-work should comply with rules that guide Intellectual Property Rights (IPR) and ethical policies. Bench-workers should be responsible for the day-to-day recording and preserving of all raw lab data. Variation from standard/published methods should be recorded. Neither overwriting nor selective deletions are permitted.

Preventive steps: Every correction should be signed and countersigned by a witness. Bench-workers should preserve all lab data and hand it over to the principal author/institution before leaving. Contributions from colleagues should be acknowledged appropriately.

Authors' and co-authors' responsibilities

International Committee of Medical Journal Editors (ICMJE) states the conditions for qualifying as an author. 'Author' is someone who has made substantial intellectual contributions. 'Substantial contribution' requires contribution towards conception and design, acquisition of data, analysis/interpretation of data, drafting the article/revising critically for intellectual content and final approval of the manuscript.[27]

Proactive steps: Authors and co-authors should

- check and verify all data
- give credit to previous work
- never submit a paper to two journals (*Ingelfinger rule*)
- never send a published result for a conference presentation
- not encourage guest authorships, gift authorships and ghost authorships

Corresponding author/co-authors should maintain all data in a well-documented form. They should declare commercial or non-commercial conflicts of interest.

Preventive steps: Authors and co-authors should

- provide information about ethical aspects where research involves human/animal/biological material
- seek permission before transferring biological samples across borders
- give funding resources
- avoid Salami publishing. "A Salami publication is one that (a) duplicates previous/simultaneous/future papers by the same author/group or, (b) could have been combined into one paper".[28]

In a recent study of 234 biomedical journals, only 29% fulfilled ICJME guidelines, whereas 41% did not include guidance on authorship. Responsibilities of authors also come into picture during thesis/dissertation writing. Data presented in one thesis should never form part of another thesis. All data when quoted should be realistic and accurate.

Academic/research institutions' responsibilities

Proactive steps: There should be a competent, vigilant and unbiased panel to review and approve the work before it is submitted to the journal. Once an author or group of authors are ready with their manuscript, it is the institution's responsibility to scrutinize and conclude whether it is worthy of communication.

Preventive steps: Heads of Institutions and influential professors, particularly from India, are sometimes accused of exploiting the bench-work of PG students for their late-career Ph.Ds. Some of these Ph.Ds could have been generated from subordinate's work. Many such Ph.Ds may not have stepped into a lab. Much of this happens probably because even the top administrators of an institution are unaware of the problems of scientific misconduct. Such malpractices should be strictly prohibited.

Punitive steps: In case of any breach of scientific ethics, punishment should be awarded. After all it is the undeterred greed for publishing, scoring and gaining applauses that drives the authors to fall prey to scientific misconduct. Academic institutions are responsible for framing and implementing rules to curb the greed for recognition.

Editor's responsibilities

Editor and the editorial board hold a great deal of responsibility while dealing with misconduct in scientific communication. They should exhibit zero tolerance to scientific misconduct as the journal owes to its readers. Therefore, editorial team must ensure that all manuscripts aimed for publication strictly pass through the ethical guidelines set for their preparation and review.[29]

Proactive steps: Editor is responsible for the entire content of the journal. Therefore, the onus of keeping the journal free from tainted papers is the editor's responsibility. Editors of medical journals should have a contract that clearly states their rights and duties, the general terms of the appointment, and the mechanisms for resolving conflict.

Preventive steps: An independent editorial advisory board may be useful in helping the editor establish and maintain editorial policy. The peer review panel and process must be adequately safeguarded by the editorial team, so that it can effectively detect any instance of misconduct.[29]

In countries like India, proficiency in English is an important issue. Poor language skills can promote a 'copy-paste' culture. The journals should assist authors by employing language editors.

A dedicated team of statisticians should be deployed by the editor to scrutinize the submitted data and if necessary, to obtain raw data from authors in order to prove authenticity of data and credibility to the statistical analysis.

Punitive steps: Authors should be asked to produce original raw data logs, whenever required. Request for original raw data would alert fraudsters and encourage early voluntary withdrawal. Authors with a history of fraudulent practices should be blacklisted and should be denied any opportunity to publish or participate in the peer review process.

Whenever a clear instance of fraud is established, authors should be blacklisted and the case brought to the notice of the institution to which the author is affiliated. Authorities such as Medical Council of India should be notified to take appropriate punitive steps. Editorial associations such as the Committee on Publication Ethics (COPE), International Committee of Medical Journal Editors (ICMJE) and World Association of Medical Editors should be informed of the defaulters, so that appropriate regulations can be framed and applied. These bodies produce guidelines on the responsibility of journal editors when research misconduct is suspected or confirmed in published or submitted articles.[30]

Reviewer's responsibilities

Proactive steps: Responsibilities of the peer reviewer include fairness in evaluation and identifying any potential conflict of interest (COI). Only experts in a specific field should agree to evaluate the quality and reliability of new contributions and distribute justice to all competing papers.

Preventive steps: A piece of work should be judged in terms of originality, integrity, strength, clarity, style and

overall quality. Blinding keeps confidentiality of reviewers. However, there are practical limits to concealing the identity of authors from reviewers.

Publisher's responsibilities

Proactive steps: Publishers' responsibility mainly lies with choosing the best editorial team. Publishers should provide frequent updates to the Editorial Board on blacklisted authors, fraudulent journals, retractions, possible conflicts of interests, etc. Statisticians should be employed to check for manipulation of data. Plagiarism detection software should be made available to the editorial office so that plagiarized articles are weeded out before peer review.

Preventive steps: Publishers should hire fraud detectives such as Uri Simonsohn, who devised a new technique to detect suspicious statistical patterns in published papers.[31] This method was used by other statisticians to reduce chances of false alarms and has tremendous potential for use more broadly in cases of suspicion.[32]

Punitive steps: Publishers' responsibility lies with supply of facilities required by the editorial team for detection of fraud and assistance in legal proceedings that may arise, if any.

CONFLICTS OF INTEREST

Conflict of interest exists when an author/author's institution/reviewer/editor have financial or personal relationships that inappropriately influence (bias) his or her actions or has been influenced by academic competition, and intellectual passion.[33] Conflicts are indicators of risks and identifying potential conflicts ahead of time reduces negative influence on research publications. However, COI rules can also hinder collaborative research between the industry and the academia. For instance, NIH scientists collaborate less with industry as a result of a 2005 ethics crack down. Eighty percent scientists say new COI rules are too strict, 75% say the rules impede NIH's scientific mission, 66% say negative impact on job satisfaction and 42% say the progress of their research had slowed.[34,35]

SCIENTIFIC MISCONDUCT IN CLINICAL TRIALS

ICMJE has announced mandatory registration of clinical trial protocols, if the results have to be accepted for publication. All clinical trial protocols should be registered in an open access portal.[36] Clinical trials are prone to ethical violations because of vested interests of the sponsors. Money power and a tendency to bypass regulatory rigours help sponsors to highlight positive findings and suppress unfavourable results. The ultimate victims are the patients.

CONCLUSION

Science knows no geographical or political boundaries. Whatever is published belongs to the world. In the wake of the stellar rise of India as a potential superpower, it is important that our young scientists be sensitized towards the perils of improper scientific conduct. India is still new to the idea of understanding, interpreting, investigating and challenging scientific misconduct. We are learning; but lack of experience and the unprofessional attitude of many authors have often embarrassed the country. A substantial part of the reports on India that appear in leading science journals focus on the country's failures, mistakes and irregularities.[12] We have a great deal to lose if we do not learn from the mistakes we have already committed.

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