

Publications: time up to bell the cat

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Publications are one of the appreciated standards in recognizing and distinguishing scientific merit. As an open record of new findings, they are expected to disseminate knowledge and propel science forward. It is the appeal of the breakthrough publication that irresistibly entices others in the field, to pursue the subject matter further, and pave way for auxiliary discoveries. Quality of the publication remarkably influences an individual researcher's job profile, research funding, recognition, collaboration and consultancy, and even enhances the reputation of the employer.

It is estimated that about 25,000 peer-reviewed scientific journals publish more than 1 million articles annually¹. Despite such astonishing numbers, the general perception is that standards of publications are on a disturbing decline, and most of these fall short in meeting the desired objectives^{2,3}. Decline in quality of original scientific thought, reproducibility of findings and skepticism over the validity of publications are fairly apparent in recent times, in nearly every field of research and development. The reason and remedy for shortcomings in publications are often not discussed in the public forum, and have been silently tolerated among the gated scientific community. Needless to state that publications have more often than not been perceived as a means to meet the academic or professional prerequisites. It is a serious concern in the Indian context too, as the Government is gearing up to give more thrust to intellectual property generation and aims to attain excellence in research and development on par with major players in the field. It raises the question as to why the subject matter of publications is experiencing a decline in quality, which needs to be addressed urgently.

While decline in the quality of publications often seems innocuous, it can inflict far-reaching damages, especially in the medical field. It triggers alarming signals when one notes that regulatory agencies increasingly rely on publications in defining critical path initiative, to predict clinical efficacy and safety of drugs. Uncertainty over the validity of a publication could hamper the progress in many a related fields of research. Indus-

trial research programmes or clinical studies based on unauthenticated publication could end up unproductive. Predictably, redundant and inconsequential publications would only widen the gap between industry and academia.

It is hard to predict the impact that a publication is likely to make. All those scientific revelations that changed the living standards of the masses have upheld certain basic principles. Arguably, it relied upon good laboratory and scientific practices, in addition to individual or collective excellence of researchers in addressing a puzzling research question. If we look back, the success of Gregor Mendel, the father of genetics, as a researcher is part of epic. It was his meticulous record-keeping and selection of a feasible research model that positioned him to answer curious questions on heredity. It enabled scrutiny, replication, verification and identification of shortcomings in his findings by others that led to the birth of modern genetics. His findings reported in the early second half of the 19th century have been incredible for simple yet meticulous experimental design, observations, statistical analysis and interpretation of results, which are seldom pursued stringently in modern times by many. Apparently, Mendel's effort symbolizes the importance of research practice and minimum standards that are required to be ensured in scientific publications.

It may be unjust to hold a single group to be responsible for declining standards of publications. In fact, multiple factors at various levels contribute to this scenario. Nonetheless, introspection by the scientific community is the primary step towards restoring the quality of publications.

Scientific originality in research question and the resulting findings is crucial if a publication has to make an impact⁴. However, it is highly compromised in the modern publish-or-perish academic set-up. Most of the research publications in the present era tend to be based on the hotly pursued paradigms and current trends. For example, as far as cancer biology is concerned, especially in the recent past, genomics, proteomics, metabolomics and autophagy-related pheno-

mena had set the trends for research. Direct consequence of such a pursuit is the accumulation of publications that may fail the 'pith and marrow' test. The presumed novelty in such findings might thus be restricted only to the inconsequential part (pith) of the publication.

On the economic front, publishing is a lucrative industry. Mushrooming of journals is inevitable in such a scenario. With the generation of hot topics and new branches of science, amateur journals find it easy to thrive in a highly competitive publishing sector. When confronted with the pressure for survival, new and unstable entrants in this field often resort to unethical practices in publishing. This dilutes the quality of publications. In the absence of any regulation, rampant chaos and indiscipline are natural in any field. It is high time that a regulatory authority is established to monitor the quality of publications and journals.

The other side of the coin is the lack of universally accepted yardstick to grade publications. Prevailing norms and guidelines to assess the research excellence and impact of a publication fall short in various fronts. While, in a few cases, it may take years to really experience the impact of a publication, many promising revelations that fail to translate into reality would fade away from limelight in due course of time. Yet, a general practice to grade a publication has been on the rise to give scores based on the impact factor (IF) of the journal in which the article was published⁵. This grade forms a decisive factor for many a prestigious scientific awards and fellowships in India too. Arguably, decline in the quality of publications is directly related to such practices. The misinterpreted concept of IF of publications has not only fuelled frantic race for publications, but also often caused sidelining of the object of human benefit from research. India, which aims to achieve excellence on par with existing international high standards, needs to be conscious of this fact. It points to the view that impact of publications ought to be assessed based on their contribution to the knowledge for human benefit.

Reproducibility of published findings is a highly debated subject matter among

researchers in the last two decades^{6,7}. Approved for its merits by proficient in the concerned field, hypothesis and concepts of a publication are expected to form the plinth of the translational endeavours. Yet many reported findings are often found to be non-reproducible and hence have failed to meet the objective of human benefit or generation of knowledge. Non-reproducibility often goes scot-free due to non-accessibility of data, obscure experimental and statistical procedures, unknown source and origin of materials, undefined experimental set-up, etc. Intriguingly, the extent of practice of research ethics, norms and guidelines across the globe is miserably obscure. It is also to be noted that, especially in life sciences arena, even with the advent and availability of technology to compress gigabyte information to a few hundred bytes without compromising the resolution, many live imaging data that could give a close to fool-proof visualization of phenomena in real time, are often unavailable in public domain. Laboratory-to-laboratory variations are often used as a defence in the event of disparity. It is high time to conclude that anything that works only under a designed set-up and is not practically enacted by counterparts, could be an artifact.

Though many plans and suggestions were put forward to ensure quality of publications, the execution has left much to be desired⁸. Hence, one solution to

this problem in the present era of digital technology is to make complete data accessible to the public in the form of scanned pages of a certified record book covering the complete experiments pertaining to the submitted manuscript upon its acceptance for publication. Experiments recorded in the research note book shall contain title in the form of clearly formulated, well-designed research questions as a preamble to the conducted experiments, and followed by aims, objectives, hypothesis, research strategy, references, materials and methods with origin of sources, research models, raw data, statistical analysis, etc. Stringent pursuit of these guidelines is required to form an integral part of specified reporting checklists for publication of articles as well as the reporting requirement of funding agencies. Such an uncompromised practice can improve the quality of publications and at the same time keep many a pretenders and intruders in scientific community on their toes.

Many researchers might argue that display of research notebook may cause the theft of their idea and data and, hence, are often unwilling to share it. It is rather an invalid ground for defence when one considers the fact that for a patent to be granted, which leads to monetary benefits for invention, it is required that information be revealed to the satisfactory level, which will enable a person skilled to replicate the invention. In many countries unfulfillment of such requirement is

a ground for revocation of even granted patents. Then, why not the complete disclosure of data in a publication which is meant for advancement of science and benefit of human beings? Scientific progress requires transparency and quality in publications. Nothing else makes more impact than contribution to the upliftment of society.

1. Larsen, P. O. and Ins, M., *Scientometrics*, 2010, **84**, 575–603.
2. Ioannidis, J. P., *PLoS Med.*, 2005, **2**, e124.
3. Bang, A., *Curr. Sci.*, 2014, **107**, 1101–1102.
4. Simonton, D. K., *Nature*, 2013, **493**, 602.
5. Satyanarayana, K., *Indian J. Physiol. Pharmacol.*, 2010, **54**, 197–212.
6. Begley, C. G. and Ioannidis, J. P., *Circ. Res.*, 2015, **116**, 116–126.
7. No authors listed, *Nature*, 2014, **515**, 517.
8. Alsheikh-Ali, A. A., Qureshi, W., Al-Mallah, M. H. and Ioannidis, J. P., *PLoS ONE*, 2011, **6**, e24357.

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