

EDITORIAL

REPORTING ANIMAL RESEARCH –ARRIVAL OF ‘ARRIVE’

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Reporting of *in vivo* animal research in a befitting way is the responsibility of the researcher. Inadequate reporting not only raises ethical and scientific concerns but also makes difficult for other researchers to comprehend and replicate the research process. NC3Rs developed ARRIVE guidelines for reporting animal research. It is the joint responsibility of all stakeholders like authors, journal editors, peer reviewers, publishers, and funding bodies to disseminate, endorse, and apply ARRIVE guidelines to get real benefit out of them. With this editorial, Pakistan Journal of Physiology endorse the ARRIVE guidelines and encourages the authors to follow these guidelines while designing and reporting their research projects. We also prompt the peer reviewers to keep in mind the ARRIVE guidelines when evaluating the publications involving animal research. We trust, by adhering to these guidelines, the quality of research projects and publications involving *in vivo* experiments on animals, will improve.

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‘A drug is a substance that, when injected into a rat, produces a scientific paper.’ (Dr. Toni Jefferys, PhD) The saying rightly reflects the prevailing mindset pertaining to medical research. For many, the ‘true objective’ of the research is getting a degree, or writing a research paper. Sacrificing animals for the so called research to get only a degree or write a research paper cannot be justified. A large number of animals are sacrificed each year in the name of ‘animal research’. This sacrifice goes in vain when the research is not reported in a befitting way. This is not only the wastage of time and resources but also ‘injustice’ to the sacrificed animals. We do experiments on animals considering that they are like us. This fact ‘they are like us’ puts us under certain moral and legal obligations at the same time. International Committee of Medical Journal Editors (ICMJE) mentioned about animal experimentation in its document on uniform requirements for manuscripts submitted to biomedical journals: ‘When reporting experiments on animals, authors should indicate whether the institutional and national guidelines for the care and use of laboratory animals were followed’.¹ Unfortunately the national guidelines vary from country to country or within a country the guidelines differ between institutions. Some countries, until recently, even did not have the comprehensive guidelines for the rights, care and use of animals in research experiments.² The phrase 3Rs (reduction, refinement and replacement) was coined by Russell and Burch in 1959 in terms of animal research.³ Even today, after passing over fifty years, the concept behind the phrase remains the bedrock of animal welfare principals in experimental research. It focuses upon reduction in number, refinement in procedure to reduce pain and distress and replacement of animal with some other ‘non-animal’ model if possible. A paradigm shift in this regard is

inevitably needed to make the research more justifiable, fruitful, reliable, and result oriented.

Researchers using animals in their research are responsible for accurate reporting about their study design, methodology and results to ensure that the animals are not wasted. Inadequate reporting of *in vivo* animal based experimental research raises many ethical and scientific concerns. Kilkenny *et al* carried out a systematic review in 2009 to evaluate the reporting system of *in vivo* research involving laboratory animals.⁴ They reviewed 271 publications and found that only 59% stated number and characteristics of the animals used. A large number of papers did not use randomization (87%) or blinding (87%) to reduce bias in animal selection and outcome assessment. Most animal studies (95%) lacked the statement about power calculations. In 30% publications it was difficult to assess whether the statistical analysis was appropriate because information regarding the statistical methods was deficient. The lack of pertinent information in reporting the research, as indicated by these findings, leads to the probability of misinterpretations of the results and also becomes a barrier to subsequently replicate the research work. Without proper reporting and sufficient details about experimental procedures, researchers at other corner of the world would have to start from scratch which is not only wastage of valuable time and resources but also unethical when the research involves experimental animals.

ARRIVE –The Solution

A group of professionals comprising of scientists, researchers, statisticians, journal editors and research funders met in June 2009, to develop guidelines that could be used to improve the reporting of animal based research. Subsequently, NC3Rs (The National Center the Replacement, Refinement and Reduction

of Animals in Research), a UK based organization, produced the guidelines in 2010 which were published in many key journals.⁵ These guidelines, called ARRIVE (Animal Research: Reporting *In Vivo* Experiments) provide a robust foundation for effective and uniform reporting system of animal based research. The ARRIVE guidelines are based upon CONSORT (Consolidated Standards of Reporting Trials) statement which has already improved reporting of the clinical trials significantly.⁶ The ARRIVE guidelines consist of 20 checklist items which have a key role to describe animal based research in a comprehensive and transparent manner. The checklist includes all the main components of a scientific publication and emphasises on the proper and detailed reporting of ethical statement, study design, experimental procedures, experimental animals, housing and husbandry and statistical analysis.⁶ Authors should submit the checklist duly completed along with their manuscript. The ARRIVE guidelines have been espoused by about 300 journals, different funding agencies in the UK, and the National Research Council Institute for Laboratory Animal Research in the US.⁷ The purpose of ARRIVE guidelines is to get maximum possible output from minimum number of experiments involving animals. In fact, adhering to the ARRIVE guidelines not only provides an opportunity to the authors to maximize the output from their research work but also portrays to the scientific community, their reflection as trustworthy and noble researchers. The ARRIVE guidelines including the checklist are available at the official web site of NC3Rs and can be accessed from the URL (<http://www.nc3rs.org.uk/page.asp?id=1357>). It is the joint responsibility of all stakeholders like authors, journal editors, peer reviewers, publishers, and funding bodies to disseminate, endorse, and apply ARRIVE guidelines

to get real benefit out of them. With this editorial, Pakistan Journal of Physiology endorse the ARRIVE guidelines and encourages the authors to follow these guidelines while designing and reporting their research projects. We also prompt the peer reviewers to keep in mind the ARRIVE guidelines when evaluating the publications involving animal research. We trust, by adhering to these guidelines, the quality of research projects and publications involving *in vivo* experiments on animals, will improve.

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