Correspondence

INTERNATIONAL JOURNAL OF SURGERY

OPEN

Lack of concordance between reporting guidelines and risk of bias assessments of preclinical studies: a call for integrated recommendations

Koohyar Ahmadzadeh, MD, Shayan Roshdi Dizaji, MD, Mahmoud Yousefifard, PhD*

Dear Editor,

Animal studies are an essential preliminary step toward investigations of disease pathophysiology, novel treatment development, and ascertainment of drug effectiveness, which ultimately pave the way for the translation of preclinical evidence to human studies. Experimental designs should avert potential biases and inadequate reporting to foster reliable and reproducible preclinical studies. Deficient preclinical research can contribute to serious financial and ethical costs. Only in the United States has irreproducible preclinical research been estimated to cause a waste of 28 billion dollars annually[1]. Therefore, it is imperative for animal studies to be designed prudently and performed explicitly.

Various guidelines have been introduced to ensure the excellence of the methodology, conduct, and reporting of animal experiments. These guidelines aid researchers in carrying out animal experiments by establishing a multifaceted framework reflecting on domains such as ethical considerations, animal care, and data reporting. In these lines, the Animal Research: Reporting of In Vivo Experiments (ARRIVE) guidelines[2] have been proposed to standardize the reports of preclinical studies. Although these guidelines are broadly acknowledged by researchers, a recent review of 765 animal experiments has shown that approximately half the studies have only partial conformity to the ARRIVE recommendations[3]. This imperfect adherence thwarts the desire for a uniform, structuralized reporting system for animal studies and challenges the audit and collation of findings. Well-designed systematic reviews and meta-analyses are currently at the top of the hierarchical pyramid of evidence.

The Systematic Review Center for Laboratory Animal Experimentation has introduced SYRCLE's guidelines for risk of bias assessment of animal studies[4]. This tool evaluates the studies based on six types of biases (selection, performance, detection, attrition, reporting, and other risks of bias) in 10 domains of sequence generation, baseline characteristics, allocation concealment, random housing, blinding, random outcome assessment, incomplete outcome data, selective outcome reporting, and other sources of bias.

In our systematic reviews of animal experiments[5], most studies were found to have possible biases in the domains of sequence generation and allocation concealment (selection bias), random housing (performance bias), random outcome assessment (detection bias), incomplete outcome data (attrition bias), and selective outcome reporting (reporting bias). Studies had not adequately addressed concerns in the above-mentioned domains and were rated as unclear or high in their risk of bias. Although it is noteworthy that some aspects of SYRCLE guidelines, such as domains related to reporting biases, are not incorporated in ARRIVE guidelines, authors might have disregarded reporting them due to word count limitations.

We suggest that research institutions introduce SYRCLE's risk of bias tool to basic science researchers for more meticulous methodology and study designs in animal experiments. ARRIVE guidelines could also be updated to include the lacking domains that exist in SYRCLE guidelines. Mandatory protocol registration before study inception, akin to the regulation stipulated for randomized clinical trials, could also facilitate the critical appraisal of study designs and enforce adherence to guidelines. Altogether, we envisage that these measures would contribute to the emergence of more high-quality *in vivo* studies yielding reliable and valid findings.

Ethical approval

Our manuscript is a correspondence, and no original research has been performed.

Consent

Our manuscript is a correspondence, and no consent forms are applicable to our manuscript.

Sources of funding

No funding was received at the inception of this correspondence.

Author contribution

All authors have contributed to the study design and drafting.

Physiology Research Center, Iran University of Medical Sciences, Tehran, Iran

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

**Corresponding author. Address: Physiology Research Center, Iran University of Medical Sciences, Hemmat Highway, P.O. Box 14665-354, Tehran, Iran. Tel:./ fax: +98 21 8670 4771. E-mail: yousefifard20@gmail.com, yousefifard.m@iums.ac.ir (M. Yousefifard).*

International Journal of Surgery (2023) 109:2557–2558

Received 5 May 2023; Accepted 8 May 2023

Published online 15 May 2023

http://dx.doi.org/10.1097/JS9.0000000000000475

Conflicts of interest disclosure

The authors declare that they have no conflicts of interest.

Research registration unique identifying number (UIN)

Not applicable.

Guarantor

The guarantor is the corresponding author, Prof Mahmoud Yousefifard.

Peer review

Not applicable.

Data availability statement

Not applicable.

References

[1] Freedman LP, Cockburn IM, Simcoe TS. The economics of reproducibility in preclinical research. PLoS Biol 2015;13:e1002165.
[2] Kilkenny C, Browne W, Cuthill IC, *et al*. Animal research: reporting in vivo experiments – the ARRIVE guidelines. J Cereb Blood Flow Metab 2011;31:991–3.
[3] Gruter BE, Croci D, Schopf S, *et al*. Systematic review and meta-analysis of methodological quality in in vivo animal studies of subarachnoid hemorrhage. Transl Stroke Res 2020;11:1175–84.
[4] Hooijmans CR, Rovers MM, de Vries RB, *et al*. SYRCLE's risk of bias tool for animal studies. BMC Med Res Methodol 2014;14:43.
[5] Askarian-Amiri S, Maleki SN, Alavi SNR, *et al*. The efficacy of GABAergic precursor cells transplantation in alleviating neuropathic pain in animal models: a systematic review and meta-analysis. Korean J Pain 2022;35:43–58.