

Avoiding Mistakes in Writing a Scientific Manuscript – A Novice’s Perspective

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Drafting, revising and publishing a scientific manuscript in a scholarly journal is a challenging yet gratifying task. It is not a very easy job at least for a novice but, at the same time, not an impossible task. Previously, some researchers have published articles on how to prepare a scientific manuscript [1-6]. This article summarizes some of the pitfalls in writing a manuscript that can be easily avoided by a novice writer.

Many novice writers are not completely familiar with the concept of plagiarism. Plagiarism refers to copying and reproducing words or concepts or ideas from others and claiming them as one’s own without acknowledging the source of origin [7]. It is an academic offence endangering publication ethics. Using paraphrases and quotations, citing the sources of information legitimately and adding appropriate reference list can avoid most incidences of plagiarism [7,8]. More information on plagiarism and its types, citing resources, and paraphrasing can be found elsewhere (<http://www.plagiarism.org/>; <http://monash.edu/library/skills/resources/tutorials/academic-integrity/>; <https://owl.english.purdue.edu/owl/resource/619/1/>).

The major sections of a manuscript are title, abstract, introduction, methods, results, discussion, conclusion and references. There have been recommendations on the order in which the sections of a manuscript need to be written [6]. Firstly, writing the methods section will be easy because it should be a part of the research proposal or the ethics application drafted before data collection [1]. Followed by this, preparing the results, discussion and conclusion sections will improve coherence and flow of the manuscript [6]. An introduction can be composed after completing these sections because this section needs critical appraisal of the literature and quoting available evidence on the research question under investigation to derive the rationale for and understand the significance of a study [2,3,6]. Finally, prepare an abstract at the end because it is a concise summary of the whole study [9]. Though a working title will be framed at the commencement of the study, a final title used for publication should reflect the aim of the study. The key words describing the study increase the retrievability of the manuscript and they can be medical subject headings (MeSH) (<http://www.nlm.nih.gov/mesh/>), Cumulative Index to Nursing and Allied Health Literature (CINAHL) subject headings (<http://health.ebsco.com/products/cinahl-plus-with-full-text>) or based on appropriate guidelines suggested by a journal (<http://www.manualtherapyjournal.com/content/authorinfo#idp1478144>).

The methods section of a manuscript is similar to a ‘cookbook recipe’ and should be written in a concise and explicit manner to allow other researchers to replicate the study [2]. The materials and methods used will determine the validity of results of the investigation [1]. If the methods used have been previously validated and published then citing appropriate references with brief explanation of the methods would be appropriate [6]. However, novel methods need to be clearly described if validation of these methods has not been previously published [2]. Incomplete description of study design, participant recruitments process (including sources of advertisement, study setting [urban/semiurban/rural; academic/community], dates of recruitment, intervention, data collection and follow-up), and rationale for screening criteria used is a common pitfall. As scholarly journals expect

reporting of ethical approval for all studies on humans and animals as a mandatory requirement, it is reported by the authors. However, whether medical studies on human participants/materials/data follow the ethical principles elucidated in the Declaration of Helsinki by the World Medical Association [10] should be clearly described. Declaration of appropriate registration of (prospective) clinical trials with clinical trial registries [3] has been lacking in many papers and quoting this will be made compulsory in scholarly journals in the years to come. A list of clinical trial registries throughout the world can be retrieved from <http://www.who.int/ictrp/network/primary/en/>. All papers invariably mention the independent and dependent variables. However, lack of reporting of any confounding (extraneous) and/or interaction (effect modifying) variables affecting the findings is not an uncommon problem. Any method used to reduce bias such as random sampling of participants and blinding of assessors and/or participants should be made clear to the readers [1]. Estimating sample size based on assumed statistical significance value, effect size and power of the study after consulting with a statistician should be considered by all the prospective authors. Studies frequently report descriptive statistics and other statistical tests (hypotheses-driven) and inference based on a classical (arbitrary) p value cut-off (<0.050). However, some studies report confidence intervals but not all. The p value will weigh “the strength of the evidence against the null hypothesis” [11]; however, it never shows the magnitude of differences observed in the outcome variables (e.g., within group [pre- and post-intervention] scores or between group scores) [12]. On the other hand, confidence intervals will reflect the range of values in which the differences are expected to lie [12]. Also, interpreting clinical significance of findings is more meaningful [3] but this is not commonly employed in all studies.

Interpreting the results just based on statistical significance without inferring clinical significance of the findings is no more considered to be a wise strategy. Reporting clinical significance based on minimal clinically important difference values after weighing the strengths and weaknesses of the methods used to define these clinical threshold values is currently recommended [13]. Overall, the results should be interpreted based on both statistical and clinical significance values [3]. A common issue while reporting results is redundancy of information in text, tables and figures [2]. This should be prevented by avoiding duplication of information in both text and illustrations [2,3,14]. Interpreting and providing implication from the results and comparing with previously published findings should be part of the discussion and

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not the results [2,3]. Explaining the common methods of (statistical) analyses with references is not needed as readers understand them easily [2]. Nevertheless, any new or complicated analysis should be (briefly) explained with appropriate reference(s) [2]. Defining various levels of p value cut-off to interpret statistical significance must be omitted and a standard cut-off decided *a priori* has to be followed. The findings should be reported as statistically significant or not without using terms such as 'greatly', 'prominently', 'highly', 'markedly', 'almost', etc while describing statistical significance. When using standard units of measurement, there is no need for any footnote (below table/illustrations) explaining them. Conversely, manuscript-specific or uncommon abbreviations should be explained [2,3,14]. Sufficing 's' to abbreviated units of measurement (e.g., kgs, cms, etc.) is another common fault to be rectified. Authors can follow the Instructions to Authors of the journal (<http://omicsonline.org/instructionsforauthors-yoga-physical-therapy-open-access.php>) for guidelines on formatting tables and figures.

The discussion section starts with an opening paragraph to answer research questions/aims of the study [14]. In this section, one has to emphasize and explain the findings and then compare to previous findings (similarities or differences) from other studies [2]. Nonetheless, reviewing literature extensively should be avoided here [14]. It is the section where one has to discuss what the results mean exactly. Discussing possible theoretical and practical (clinical) implications from the study is an advantage to readers [2]. Conversely, over-interpretation and unwarranted extrapolation of findings from the study should be neglected [14]. Recapitulation of results under the discussion is inappropriate [2]. Tendency to quote only the positive findings first, though they might be either pertaining to secondary outcome measures or additional findings from the study, can be noted in some papers. Irrespective of statistical significance, discussing the (hypotheses-driven) findings related to the primary aim followed by the secondary aim is a good practice [15]. Any additional/accidental (important) findings not directly related to the aims of the study, can be addressed after discussing the answers to research questions of the study [15]. It is important to mention all the factors that will affect the (internal or external) validity of findings as limitations of the study [16,17]. Possible solutions to overcome these limitations should be recommended for future studies [17].

Stating future recommendations and limitations of the study under the conclusion can be found in some papers but it will be appropriate to conclude with the answers to research questions of the study. Importantly, any conclusion that is not supported by data is a blunder [14]. In addition, including new ideas/findings, quotations or making emotional appeals under the conclusion are other common mistakes [18]. Using references to state the conclusion of the study shows that the authors are not really convinced with their findings and they need additional literature to support their own conclusions. These problems should be carefully prevented.

Writing an introduction can be quite challenging as it needs a general description of the research problem, a succinct review of literature and the current evidence and the literature gap derived thereof on the topic under investigation [2,3,6]. The ultimate focus of the introduction is to derive the rationale and justify the need for the study and narrate the research questions/aims and hypotheses of the study [2,3,6,14]. Writers should provide a critical appraisal and summary of studies relevant to the investigated topic, which would entail the research problem, rather than a comprehensive review of literature under the introduction [2,3,6,14]. Except for literature reviews, tables elaborating/summarizing

vital information of all the relevant studies are not needed for other types of studies. Stating aims and hypotheses in a general way instead of being up to the point would puzzle the readers and they might end up in hunting for what are the actual research questions(s). Therefore, aims and hypotheses of the study should be described explicitly without verbose.

The title and abstract of a study are used for indexing purposes [2]. The title of the study should reflect the aim of the study in a concise and explicit manner without verbiage [2]. It can be written as a statement or a query or an answer [14]. A good title might include two or more of the following components depending on the type of the study - Participant or research Problem, Intervention, Control or Comparison, Outcome and Study design. Using abbreviations, chemical formulas or technical/clinical jargon in the title will lead to more ambiguity [2]. Though humorous or fancy or criticizing titles are well acclaimed for news papers/magazines, they do not suit well for scholarly scientific journals.

The abstract is a standalone section explaining the whole study in a concise summary of 250-300 words (usually) [2,9]. It includes all the main sections of the manuscript except the discussion [2]. Most of the times, we may not find absolute or relative values of the outcome measures representing clinical significance of the findings. It is worth to summarize the values of both statistical and clinical significance of study findings in the abstract. The abstract should be written in simple English with less number of abbreviations and without new ideas, speculation, and references [2,19].

One of the confusions to novice writers, whose first language is not English, is the tense used for writing different sections of the manuscript. Whenever established facts are written, they should be written in present tense [2]. While describing the current study which is yet to be published, it should be written in past tense [2].

Avoid using interchangeable or synonymous terms for key words throughout the manuscript. Formatting guidelines of a specific journal, to which the manuscript is to be submitted, should be strictly followed for specifications on word limit, key words, headings/sub-headings, font size, line spacing, page and line numbers, tables, figures, referencing style, ethics, acknowledgements, and declaration of conflict of interest and funding resources. Further details on the issues related to conflict of interest policies can be obtained from <http://www.icmje.org/conflicts-of-interest/>, <http://www.springer.com/adis/journal/40258>, and other sources [20-23]. Citing references and formatting bibliography can be a daunting and time-consuming task. Nevertheless, availability of reference managing software programs (<http://endnote.com/>; <http://www.mendeley.com/>, etc.) has made referencing easy now-a-days. Last but not least, authors should pay attention in detail to grammar, punctuation, spelling, organisation of paragraphs, coherence, logical flow and clarity of content, and use of (discipline-specific) current terminology. There are professional language editing services available to improve correct usage of the English language in the manuscript and authors can make use of them if required. A pre-submission inquiry to the Journal of Yoga & Physical Therapy to confirm whether your manuscript will fit into the scope of the journal will save time and also prevent early rejections.

Overall, this editorial article provides a brief overview of manuscript structure and suggestions to overcome some common faults associated with manuscript writing. However, readers are recommended to go through other publications on manuscript writing to improve their writing skills.

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