Editorial

Essential Steps in Writing and Publishing a Scientific Research Paper

Rabeya Yousuf[1], Md Mushtahid Salam[2], Shaeri Jahra Amreen[3], Hasbullani Zakaria[4],Jamaludin Zainol[5], Abdus Salam[6], Abu Kholdun Al-Mahmood[7]

Bangladesh Journal of Medical Science Vol. 23 No. 01 January'24 Page : 12-17
DOI: https://doi.org/10.3329/bjms.v23i1.70663

Introduction

The word "research" means to search repeatedly[1]. Why repeats a search? The answer is to validate and upgrade the current knowledge and to create a new discovery to enrich the existing knowledge[2]. Research is a scientific method or methodical investigation /inquiry for answering a research question or problem[1,2], where the researchers solve the problem or generate new knowledge through a systematic collection, organization, and analysis of data; the ultimate aim of which is to make the research findings supportive in decision-making[1]. The effect of research enhances the society by significant knowledge formation based on the societal problems[3]. Any scientific research is incomplete until its results are published to help in the progression and development of science. The dissemination of research results also provides satisfaction to the researchers and helps in the protection of intellectual property[4]. Publishing a research paper comprised two things, (1) writing a manuscript of scientific research, and (2) selecting an appropriate journal and submit the manuscript for publication to the selected journal. This paper describes the structure and necessary steps required during writing a manuscript and the subsequent steps in submitting, reviewing and publishing the manuscript.

Writing a manuscript of scientific research

Finding time is a major challenge to write a scientific paper and its submission to a suitable peer-reviewed journal for publication. Other than that, beginners with poor writing habit, lacking experience and knowledge in writing the manuscript, and lack of confidence adds to the barriers to writing and publication[4]. Therefore, a good plan for writing to effectively squeeze time between other work and having a clear understanding of the structure used in the manuscript can help to accomplish the writing[5].

Writing a scientific paper starts with selecting a suitable outcome or objective and should be aligned with the different sections of the manuscript. It is

1. Rabeya Yousuf, Blood Bank Unit, Department of Diagnostic Laboratory Services, Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia (UKM) Medical Centre, Malaysia,
2. Md Mushtahid Salam, Centre for Data Analytics and Society, The Cathie Marsh Institute, University of Manchester, Manchester, UK.
3. Shaeri Jahra Amreen, MBBS Student, Dhaka Central International Medical College, Ring Road, Shyamoli, Dhaka, Bangladesh.
4. Hasbullani Zakaria, Biochemistry Unit, Faculty of Medicine and Deputy Vice Chancellor (Research & Postgraduate),Widad University College, Kuantan, Malaysia
5. Jamaludin Zainol, Professor of Surgery and Dean, Faculty of Medicine and Deputy Vice Chancellor (Academic and Internationalization), Widad University College, Kuantan, Pahang, Malaysia.
6. Abdus Salam, Associate Professor and Head of Medical Education Unit, Faculty of Medicine, Widad University College, Kuantan, Pahang, Malaysia.
7. Abu Kholdun Al-Mahmood, Professor and Head of Biochemistry Department, Faculty of Medicine, Ibn Sina Medical College, Bangladesh

Correspondence: Dr Abdus Salam, Consultant Medical Educationalist and Public Health Specialist Medical Education Unit, Faculty of Medicine, Widad University College, Bandar Indera Mahkota (BIM) Point, 25200 Kuantan, Pahang, Malaysia, Email: abdussalan.dr@gmail.com ORCID ID: https://orcid.org/0000-0003-0266-9747

necessary to set a deadline for all the authors. The classical structure of an original scientific research paper generally includes (1) a Title (2) an Abstract with a few keywords (3) an Introduction with a clear objective (4) Materials and Methods (5) Results (6) Discussion (7) Conclusion (8) Acknowledgement (9) References and (10) Supplementary Data5. Broadly, the classic structure follows the IMRAD format which is an acronym that stands for the different sections of the manuscript namely: the introduction, methods, results and discussion6.

Title: How should it be?

The editor and the reviewers are the first readers of the article, who will check whether the title is matched and aligned with the content of the manuscript. To attract a large readership and avoid distractions of readers, the title needs to be simple, informative, concise and attractive[7]. It should be clear, not too long, typically consists of around 10-12 words, contain few keywords, and should avoid abbreviations or jargon. The title must reflect the content of the article[5].

Abstract

It is the summary of the study which conveys the paper's purpose and a short description of materials and methods, key results with a short interpretation and conclusion[5]. The abstract, together with the title need to be interesting, and clear which actually acts as the advertisement of the article. A good abstract attracts the reader's attention and motivates them to complete the reading of the article. The abstract should be summarized with the main findings, so that the readers can comprehend the research without reading the whole article. The abstract is usually categorized as unstructured comprised of 150 words or structured having an introduction, methods, results and conclusion, usually comprised of 250 words. However, it depends on the journal guideline, therefore, while writing an abstract the journal guideline should be followed strictly[7].

Keywords

Keywords are usually 3-5 in number and used for indexing the paper, that helps to search the related articles from the search engines such as PubMed, Google Scholar, Science Direct etc.[7]. The terms used in the keywords should be available from the medical subject headings (MeSH) list[8]. The number of keywords required for the specific journal should be followed according to the 'Guide for Authors' of that particular journal.

Introduction: How to write a convincing introduction?

A convincing introduction is a brief background of the titled subject by recent updated data and ultimately focuses the readers on the research question. A good introduction should include (i) the background of the problem to be solved and the importance of the study (ii) a literature review based on the topic and detecting of inadequacy in previous literature (iii) a knowledge gap in the available literature or indicating a problem associated with the topic, (iv) research question to be addressed (v) significance of the study (vi) objective and hypothesis of the study[4,5,9]. The introduction section should attract the reader's attention to the crucial issue and rationale that address the paper. As an author, here is the opportunity to convince the readers to know a compelling introduction about the research to be done and its usefulness[9]. It is an important step to ensure the manuscript flows logically and it does not mix with results, discussion etc. Objectives of the study must be clearly mentioned in the last paragraph of the introduction section along with a brief implication or importance of the study[4]. Editors like to see as a rule of thumb, the introduction section accounts for about 10% of the total word count of the paper or written with around 400 words over 1-4 paragraphs in a 4000 words paper. The top 5-10 relevant literature or key references is a good number for a literature review[6,7]. Editors do not like to see the addition of irrelevant literature review, or any inappropriate conclusions of authors' own achievements[7]. Introduction section is usually written using present tense to describe the established facts[9].

Materials and Methods

This section defines how the research study is to be carried out. It includes (1) the design of the study (qualitative, quantitative or mixed method; prospective, retrospective or cross-sectional design; observational, analytical, interventional or quasi-experimental etc.). (2) inclusion and exclusion criteria, (3) study population and sample size including methods of sampling or methods of selection of sample size, (4) place of study, (5) period and duration of the study,

(6) methods of data collection (7) methods of data analysis, (8) data collection tools in questionnaire survey including validation of tool[6]. The methodology of special investigations such as surgical procedure with the equipment used needs to be described in detail[10]. The ethical approval of the study from the institutional review board should be clearly described in the materials and methods section. Information about informed consent should be explained clearly[4]. If the method section is not properly described or wrong methods are used, there are high chances of rejection by the journal editors[11]. The research should be planned and conducted properly to obtain a meaningful result that will help to prepare a worthwhile paper[12]. Description of the Methods section should be written in the past tense as the work following the method is already done by the authors[9].

Results

The results section can be displayed as text, tables, figures, charts and graphs to present the key findings. The results should be presented keeping the sequence similar to that mentioned in the methods section. It should be summarized by descriptive sentences for each table, but the discussion of the result should be avoided here[9,13]. The results are described using past tense because they refer to the study results that are already done[9]. The tables or figures should have titles or legends correctly describing them so that they will be clearly understandable. There is a restriction of the numbers/figures according to the journal format. Therefore, too many tables or figures cannot be added. In such cases, two or more tables or figures of similar types of results can be put into one by giving a subheading to restrict the number of tables/figures. The same result should not be presented in both tables and graphs. The presentation of too many results is very difficult to understand. Therefore, only essential data to be kept and the data that does not pertain to the aims of the study should be deleted[7].

Discussions

Here, in the first paragraph, a summary based on key findings are described. Subsequently, the comparison with supporting data from the literature that agrees or contradicts current results and the reason behind this agreement or disagreement should be described. The significant results are only to be discussed and should avoid the repetition of the result section[4,5]. It is better to take each aspect of the result and discuss them individually.

The limitations of the study are an important part which are usually written in the last paragraph of the discussion section. The limitations could be inadequate sample size, any shortcoming related to study design, resources used, research period, funding etc. In every research, there are possibility of flaws or inadequacies, therefore, stating limitations of the study reflects honesty and transparency of the authors. It also reveals the authors' understanding about the research done[6,9]. The last paragraph includes the importance of the work by mentioning the application, significance or implication, and recommendations[5].

Conclusion

The conclusion includes 3-5 sentences, that summarize the findings of the entire paper and include a final comment based on the finding[4]. Finally, it includes suggestions for further improvement and further research to be done[5]. In some journals, the conclusion is placed as a separate section while in others, it is combined with the discussion. In either case, it must be clear, so that the reviewers can be able to judge the work. It is necessary to avoid undue speculation beyond the study results[7].

Acknowledgement

In the acknowledgement section, authors got the opportunity to thank the people who contribute to the study but do not meet the criteria as co-author. The enclosure of the granting or funding agency is included here with mentioning the grant number[14].

Authors' contribution:

Authorship determination and sequence of authorship in the paper as well as corresponding authorship determination is an important step to avoid conflicts[14]. Authorship criteria is recommended by the International Committee of Medical Journal Editors[15]. It depends on four criteria: (1) "substantial contributions to the conception or design of the study; or the acquisition, analysis, or interpretation of data"; And (2) "drafting or revising it critically for important intellectual content'; And (3) 'final approval of the version to be published"; And (4) "agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved"[15].

References

By strictly following the journal guideline, the in-text citation and reference list should be prepared. Reference managing software is now available which is helpful in writing the references.

Choosing an appropriate journal and submit the paper for publication to the selected journal.

To submit a manuscript, appropriate journal selection is an important step. The journal selection is done following a few criteria such as journal's aim and scope, editorial board, indexation, publication frequency, journal reputation, impact factor, author guideline, peer review process, publication charges of the journal etc[16]. Also, need to read a few sample articles published in that particular journal. A well-reputed journal is indexed in by major databases such as MEDLINE, Web of Science, Scopus, EMBASE, Cumulative Index for Allied and Health Literature (CINAHL), and others[16]. As soon as a suitable journal is selected, the manuscript needs to be prepared by strictly following the guideline for the authors of that particular chosen journal. Before submission, the manuscript needs to be checked for plagiarism using software; as well as spelling and grammar check of the manuscript[17]. Manuscript submission is mostly by online submission system or some journals allows it through e-mail.

Prepare a cover letter

While submitting the article to a journal, it must be accompanied by a cover letter, addressed to the journal editor. The cover letter contains a summary of the significance of the study, so the editors have an idea about the context of the study. It also assures the editors that the manuscript has not been published or simultaneously submitted to any other journal[18].

Prepare a title page

The title page should include the type of article, the title of the article, authors' names with affiliated institutions, corresponding authors' detailed addresses and email, short-running title, conflict of interest and funding source. The authors' placement should follow the sequence or order along with affiliation. Some journal wants a summary statistic on the title page, such as word counts, number of tables/figures, references etc. Submission may be online or via email depending on the journal guideline.

Review Process

After submission, the paper will be read by the Editor-in-Chief to assess suitability for the journal. If the manuscript does not fit into the journal, it may be rejected by the Editor, and the author is notified. It is found that around 20-30% of the manuscripts are quickly decided as unsuitable or beyond the scope of the journal by the Editor-in-chief [11]. If the Editor-in-chief selects the manuscript, it will be sent to at least two reviewers for peer review. Peer review is a quality control mechanism to select quality articles for publication. Thus, the publication standard is maintained and truthful and accurate reports are published[19].

The review process may be single-blinded or double-blinded depending on the journal. In a single-blind review, the reviewers know the name and affiliation of the authors while the authors don't know about the reviewer's identity. This is a traditional model of peer review, but it may be subjected to be biased. In a double-blind review, neither the authors nor the reviewers know each other's names and affiliations. Here the risk of bias is reduced, and the study's validity is increased[19]. Reviewers determine the validity, significance, and originality of the study, and may suggest improvements to the manuscript and the study. Based on the recommendation of the peer review, the manuscript status can be accepted, accepted with revisions, or rejected[19].

Reasons for manuscript rejection

Scientific research is research, but not all research is scientific[2]. Manuscript rejection is a norm in academic publishing. The most common reasons for rejection of a scientific paper include; (i) Lack of originality, and presentation of obsolete study or out-of-date contents, (ii) Poorly written manuscript: poor introduction and problem statement / unimportant and irrelevant subject matter, (iii) Flaws in methodology and study design: choice of unreliable or incorrect method or model, problems with the control or case group, small or inappropriate sample, inappropriate instrumentation, unreliable or incomplete data, inappropriate or incomplete statistics (iv) Discussion that only repeats the results without interpretation, insufficient literature review, (v) Overstatement of conclusions, (vi) Paper that does not follow the author guideline or not meet the scope of the journal[11].

Revise and then resubmit stage: How to respond to the reviewer's comments?

Most manuscripts are usually sent back for revision at least once before they are accepted by a journal. The corresponding author will be notified about the status of manuscript which are (1) Accepted, (2) Accepted with minor revision, (3). Accepted with major revision and resubmit: here the journal has an interest in this manuscript and thereby asking to resubmit after the major corrections are done by the authors according to the reviewer's comment. (4). Reject: this manuscript is unsuitable for publication[18]. In the above second and third cases, revision of the manuscript should be done according to the reviewers' suggestions and the revised paper should be resend or resubmit to the editor. During the resubmission, a cover letter to be sent that should contain the answers to the reviewer's comment, point by point, even if there is any disagreement or even not able to make all the suggested changes should be mentioned with reason. At the revision and resubmitting stage, a good cover letter with clear and respectful responses to each reviewer's comment can increase the possibility of acceptance[18].

If the paper is rejected, it does not necessarily mean bad writing. There are many reasons for rejection. Therefore, instead of disappointment, the manuscript should be improved and the revised paper should be submitted to another suitable journal[11]. Finally, when the manuscript is accepted, the galley proof of the article should be checked carefully and the corrected proof should be sent to the editor in time.

Galley Proofs

Galley proofs are the preliminary version or preview of publication for authors, editors, and publishers to identify any error that need correction[20]. After acceptance of the paper, the galley proof is sent to the corresponding author and usually 24-72 hours are given to correct the mistakes such as checking the names of authors, spelling, and spacing between words. etc. No major change can be made at this stage.

Conclusions

Any research is incomplete until its results are published. To publish a research paper for an academic journal, first need to write the paper /manuscript following the scientific methods and secondly, need to choose a suitable journal, and revise the manuscript strictly following the guidelines of the chosen journal to be submitted. Prepare a package of a cover letter and title page along with the manuscript and submit following the journal instruction online or by email and wait for the review result. Rejection is a norm of academic publishing, if rejected, should not be disappointed; the paper should be improved and to be send to another suitable journal.

Source of fund: (if any). Not applicable

Conflict of Interest: None

Ethical clearence: Not applicable

Authors's contribution:

All authors have participated acceptably in the conception, design, writing and editing of this paper and approved the final version for submission to the Journal for publication.

References

1. Kabir SMS. Basic Guidelines for Research: An Introductory Approach for All Disciplines. First Edition, July 2016, pp.1-22. Book Zone Publication, Chittagong-4203, Bangladesh. Available at: https://www.researchgate.net/publication/325846733
2. Naidoo N. What is research? A conceptual understanding. *African Journal of Emergency Medicine* 2011; **1**:47-48.
3. Khan, MI. Towards the preparation of highest quality medical professionals. *Bangladesh Journal of Medical Science* 2010; **9**(3), 116-123. https://doi.org/10.3329/bjms.v9i3.6465
4. Hoogenboom BJ, Manske RC. *The International Journal of Sports Physical Therapy* 2012; **7** (5): 512-517.
5. Yusoff MSB. ABC of manuscript writing. *Education in Medicine Journal* 2018;**10**(2):61-67. https://doi.org/10.21315/eimj2018.10.2.8s
6. De Araújo CG. Detailing the writing of scientific manuscripts: 25-30 paragraphs. *Arq Bras Cardiol.* 2014;**102**(2):e21-3. doi: 10.5935/abc.20140019.
7. Borja A. 11 steps to structuring a science paper editors will take seriously. Elsevier Connect 2021; Retrieved on 22 May 2023 from: https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously
8. Behzadi E, Behzadi P, Ranjbar R. ABC's of Writing Scientific Paper. *Infectio.ro.* 2013;**33**(1): 6-7
9. Huston P, Choi BCK. A guide to publishing scientific research in the health sciences. *Can Commun Dis Rep*. 2017; **43**(9):169-75. https://doi.org/10.14745/ccdr.v43i09a01.
10. Erdemir F. How to write a materials and methods section of a scientific article? *Turk J Urol*. 2013;**39**(Suppl 1):10-5. doi: 10.5152/tud.2013.047.
11. Ali J. Manuscript Rejection: Causes and Remedies. *J Young Pharm* 2010; **2**(1):3-6.
12. Khan, MI. Sophistication of Medical writings. *Bangladesh Journal of Medical Science* 2009; **8**(3), 44–45. https://doi.org/10.3329/bjms.v8i3.3981
13. Turbek SP, Chock TM, Donahue K, Havrilla CA, Oliverio AM, Polutchko SK, et al. *Bulletin of the Ecological Society of America* 2016; **97**(4): 417-426.
14. Delvin E, Pillay TS, Newman A. How to Write a Scientific Paper: Practical Guidelines. *The journal of International federation of Clinical Chemistry and laboratory Medicine*. 2014; **24**;25(3):259-268.
15. International Committee of Medical Journal Editors (ICMJE). Defining the Role of Authors and Contributors. 2023. Retrieved on 23 May 2023 from: https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html#two.
16. Suiter AM, Sarli CC. Selecting a Journal for Publication: Criteria to Consider. *Mo Med.* 2019;**116**(6):461-465.
17. Lövei GL. Writing and Publishing Scientific Papers: A Primer for the Non-English Speaker.Cambridge, UK: Open Book Publishers, 2021, https://doi.org/10.11647/OBP.0235
18. Balch CM, McMasters KM, Klimberg VS, Pawlik TM, Posner MC, Roh M, Tanabe KK, Whippen D, Ikoma N. Steps to Getting Your Manuscript Published in a High-Quality Medical Journal. *Ann Surg Oncol*. 2018;**25**(4):850-855. doi: 10.1245/s10434-017-6320-6.
19. Voight ML, Hoogenboom BJ. Publishing your work in a journal: understanding the peer review process. *The International Journal of Sports Physical Therapy* 2012; **7** (5): 452-460.
20. Elston DM. Accepted manuscripts and galley proofs. *Journal of the American Academy of Dermatology* 2019; **81**(1): 73. https://doi.org/10.1016/j.jaad.2018.12.024.