Writing an Original Article for Medicine and Health Sciences

Abstract

Research in this age is of great importance. In the areas of product manufacturing and knowledge, the effect of research can be clearly seen. Thus, teaching how to write a scientific article can help. A point that is very important in writing a scientific paper is the individual’s interest in the subject of research. If the researcher is not interested in the subject, it will be difficult for him. Hence, the researcher’s knowledge about the topic is important. A scientific paper has a structure consisting of several sections including introduction, methodology, results, discussion, conclusion, acknowledgment and references. Awareness of these sections and how they can be written can help writers and researchers to write valuable articles.

Keywords: Article; Strategies; Tips; Writing;

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Introduction

Research conducted by an author is of paramount importance, and the findings broaden the horizons of new knowledge in the field of the research. In the modern era, research findings of an author become the products that affect the economy\(^1,2\). In order to reap benefits from the endeavors of researchers, the findings must be implemented within a specific framework. Scientific articles are published in journals with various formats, and the structure of an article is explained in the ‘authors’ guide’ section of every journal.

Most scientific articles follow the IMRaD format, which was first proposed in the field of medicine and health by the International Committee of Medical Journal Editors in 1978 (Table 1). In the IMRaD format, the sequence of the sections of an article is introduction, methodology, results, discussion, conclusion, acknowledgment and references. Awareness of these sections and how they can be written can help writers and researchers to write valuable articles.

Keywords: Article; Strategies; Tips; Writing;

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Title

The title of an article is the first part that is read by the audience, which requires further evaluation than the other sections of an article since it contains the essence of the research. Normally, the number of the readers is reduced by a factor of 10 from one section to another in the writing of an article. In other words, per each 10 readers who review the title of the article, one reader reviews the abstract, and per each 10 readers who review the abstract, one reader reviews the results section, particularly the tables and figures. As such, per each 10 readers who review the results section, one reader goes through the entire article; as a result, the title of an article is often read 1000 times\(^4\). This highlights the importance of the title in an article and its selection\(^5\).

How could we select the most appropriate title for an article? It is best to choose the subjects that you are most familiar with to smooth the progress of article writing\(^6\).
Table 1. Main sections of an article based on IMRaD format

<table>
<thead>
<tr>
<th>Section</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>What is the article about?</td>
</tr>
<tr>
<td>Authors</td>
<td>Names and affiliations</td>
</tr>
<tr>
<td>Keywords</td>
<td>The words properly representing the article (not shown in the title)</td>
</tr>
<tr>
<td>Abstract</td>
<td>An abstract of the article</td>
</tr>
<tr>
<td>Introduction</td>
<td>The reason to choose the article, explaining about the issues and questions regarding the subject matter</td>
</tr>
<tr>
<td>Methodology</td>
<td>How was the study conducted?</td>
</tr>
<tr>
<td>Results</td>
<td>What were the findings?</td>
</tr>
<tr>
<td>Discussion</td>
<td>What did the findings indicate (interpreting the data)?</td>
</tr>
<tr>
<td>Conclusion</td>
<td>What should be done afterwards?</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>Who contributed to the article and how? Who funded the research?</td>
</tr>
<tr>
<td>References</td>
<td>Details on the references</td>
</tr>
<tr>
<td>Appendix</td>
<td>Complementary data</td>
</tr>
</tbody>
</table>

A proper title is concise, containing the least number of words and numbers. Most journals have a word limit of 10 for the title, so that it would be comprehensible and quickly convey the essence of the study. In addition, the title should not contain any acronyms or abbreviations, and expressions such as ‘study of’, ‘observations in’, ‘evaluation of’, and ‘research on’ should not used in the title.

The subject of the research must be prioritized in accordance with the style of the journal. The subject should be exclusive and attained through the following questions:

1) Who are being investigated in the research?
2) what is the main subject (gap)?
3) what are my views (the researcher) toward the subject?
4) why is the subject important?
5) how;
6) where;
7) when has the subject (issue) arisen?
8) how could it be resolved?

An example is this regard is as follows: The knee joint is the most important joint in the human body (in broad terms); in which individuals is this joint important? The elderly; what is the associated gap? Reduced daily activities; what are my views? This is an important issue that decreases mobility, leading to musculoskeletal disorders; what is the solution? Performing physical activities; what is the significance of the issue? It is associated with a higher risk of arthritis in the elderly; how, where, and when does it occur? The elderly feel an intense, deep pain in their knee at the start of the day; what is the solution? Performing physical exercises. Eventually, the title related to this article could be the “Effects of Physical Exercise on the Reduction of Knee Pain in the Elderly” (Figure 1). To select an appropriate subject, narrow it down into the mentioned questions using different approaches and determine a clear title at the final stage.

Some journals require a ‘running title’ or ‘short title’ in the articles. A running title is the shortened title, which is placed on top of the pages of the article with variable word limits depending on the journal (maximum: 40 characters). In a study by Adrian Letchford et al. (2016) entitled “The advantage of short paper title”, 140,000 highly-cited articles during 2007-2013 in Scopus database were compared with the number of the citations. According to the results, citation rate was higher in the articles with running titles compared to those without a short title.

Authors

Authors of scientific articles are those who play the main roles in the planning, design, preparation, and presentation of the article. Authors must mention their last academic degree although it is not published by some journals. Moreover, the university, institution...
or organization to which the author is affiliated must be noted. Among the other mandatory information of authors are the contact routes (email, contact number)\(^{(3,4)}\). According to the recommendations of the ICMJE, the Open Researcher and Contributor Identification (ORCID) must be noted in front of the names of the authors\(^{(3)}\). The guidelines in this regard are available on the ICMJE website\(^{(9)}\).

In the past, the names of the authors would be alphabetically sequenced, while this is obsolete nowadays\(^{(4)}\). The first author is the one with the most contribution to the research\(^{(10,11)}\), and the co-authors are those who assist the first author in the writing of the manuscript, data collection, and data analysis. The last author is mainly involved in the consultation, guidance, and editing of the manuscript; it is notable that the order of the authors is usually determined upon agreement\(^{(4,12)}\). The first author often has higher academic degrees compared to the other authors (e.g., MSc, advisor), and some journals recognize the last author as the “corresponding author”, who is scientifically accountable\(^{(4,12,13)}\).

Calculation of the influence score of articles is often identical for all authors in foreign journals\(^{(14)}\); for instance, \(^{(15,16)}\). However, influence scores of articles are verified differently in the universities in Iran despite following to a specific framework (Table 2)\(^{(17)}\).

### Table 2. Calculation of influence scores of articles in Iran

<table>
<thead>
<tr>
<th>Number of Authors</th>
<th>Share of Each Author from the Calculated Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>90%</td>
</tr>
<tr>
<td>3</td>
<td>80%</td>
</tr>
<tr>
<td>4</td>
<td>70%</td>
</tr>
<tr>
<td>5</td>
<td>60%</td>
</tr>
<tr>
<td>More than five</td>
<td>50%</td>
</tr>
</tbody>
</table>

### Keywords

Keywords are the words that are related to the main subject and represent the basic contents of the research. Keywords follow the abstract of the article and are the most commonly used words and phrases throughout the research. It should be noted that the words used in the title of the article must not be repeated in the keywords. Despite the variations in different journals, there should be 5-7 keywords in an article\(^{(3)}\).

To select the most appropriate keywords, the phrases should be in the MeSH format in the outlines of medical subjects. MeSH is used for the indexing of articles and bibliographies in the national website of the biomedical and health data, allowing your article to be properly indexed in electronic science databases\(^{(18)}\). For access to MeSH, you could refer to the PubMed website (https://meshb.nlm.nih.gov/search).

### Abstract

Abstract is a shortened version of the article\(^{(19)}\). According to the American National Standards Institute (ANSI), a good abstract helps the reader to quickly and accurately realize the main contents of an article\(^{(20)}\). Therefore, an abstract is similar to a window that opens to the foremost findings of an article in the most precise manner\(^{(21)}\).

The abstract is often written separately on the second page of the article. It could be structured or unstructured depending on the style of the journal. An unstructured abstract is a paragraph, in which the contents are presented successively. In a structured abstract, the contents are categorized into various paragraphs, including the introduction, methodology, results, and conclusion. In some journals, the abstract should also include the objectives and limitations of the study\(^{(21)}\). If the article has been prepared on a grant or fund, it should be noted after the abstract\(^{(3)}\).

The length of an abstract varies in different journals, and the word limit is generally 150-250\(^{(4,22,23)}\). One of the reasons for this word limit is that databases such as PubMed have determined a word limit of 250, which has recently been disregarded\(^{(24)}\). Refrain from
using acronyms and referring to other articles, tables, and figures in the article. This section should only include a report without any interpretation or evaluation.

Since the abstract is a short version of the article, the verb tenses used in this section should differ from the other sections of the article. As such, the introduction, interpretation of the results, discussion, and conclusion in the abstract are written in the present tense, while the results and methodology are written in the past tense.

**Introduction**

Introduction is the first section of an article, which presents the background about the research subject and clearly denotes the recommended hypotheses in this regard. This section of the article must provide the readers with fundamental information, so that they could comprehend the subject and judge the article. In addition, the introduction shows the interest of the author in the subject of the research, as well as the reasons for the selection of the topic.

A good introduction is often short, and most journals suggest the minimum word limit of 500. An introduction includes theoretical concepts (background), research question/hypothesis, previous research, and the necessity of the research. In terms of the format, the introduction resembles a cone; in other words, it begins with broad terms and concepts, followed by the narrowing down of the concepts, and concluding with the research question and objectives.

The beginning of the introduction is the most important part since it should motivate the reader by explaining the significance of the subject. The introduction begins with a brief background regarding the main topic of the article, followed by the statement of the problem and the ‘gap’. When the gap has been clarified, the author should review the previous studies that have focused on the gap and elaborate on the relationship of these studies and his/her own research. A common problem among authors is the lack of clear explanation in this regard. Only a few studies (four or five) should be presented in the introduction, so that the readers would not be confused. Another theme in the introduction section is to determine the objectives of the research and the methodologies chosen for bridging the gap. Afterwards, the author should mention the significance of the subject, ending the introduction with the objectives of the study.

The introduction is written in the past and present tense; the part regarding the motivation behind conducting the study is often in the present tense, and the part that reviews the previous studies and research objectives is in the past tense. Some of the main problems in authorship include not mentioning the objectives and references of the previous studies, using the pronoun ‘I’ in the introduction, and overuse of the keywords in the introduction part.

Novice authors may only write down what is on their mind without regard for the audience, coherence of the article, and adequacy of their knowledge on the subject of the research. To address this issue, it is recommended that the author ask a few experts to review the article after the first draft in order to obtain feedback.

**Materials and Methods**

Methodology (materials and methods) follows the introduction in a paper, which describes the implementation of the research, features of the samples, applied tools and instruments, and methods used in the research. This section of the article should be prepared in such way that the readers and other audience would be able to repeat the procedures in further investigation.

In writing the methodology section, the order of the stages in the study should be observed; the main stages should be sequenced as...
The sample population, applied tools and instruments, and research processes. Data on the studied sample population are presented in the first sub-section, which is entitled ‘participants’ or ‘subjects’ in italicized letters. Details on the type of the research, sample population, limitations of the study, studied variables, and inclusion/exclusion criteria of the subjects are also presented in this sub-section.

The following sub-sections are entitled ‘measures’ or ‘materials’ in italicized letters, which includes the data on the applied tools, type of treatment or intervention, and the validity and reliability of the research instruments.

In the final sub-section, the ‘procedures’ are described, and details are provided on the data collection, performing the study, research ethics, and use of statistical methods for data analysis. If the applied methodology is based upon the methods used in the previous studies, a brief explanation is required in this regard. It is also noteworthy that in some journals, the sub-sections have a specific format, while the methodology section is written as a whole in other journals as well. The methodology section should be written in the past tense.

In this section of the paper, the author interprets the results of the study. The discussion includes theoretical and scientific principles, findings, and methodology. Moreover, the author should compare the results of the study with the previous findings, discussing the similarities and discrepancies and their causes. The strengths and limitations of the study should also be reviewed in the discussion section, which could be about the selection of the sample population, research instruments, study design, intervention, and data collection methods. Afterwards, a few recommendations or suggestions could be provided.

Discussion

In this section of the paper, the author interprets the results of the study. The discussion includes theoretical and scientific principles, findings, and methodology. Moreover, the author should compare the results of the study with the previous findings, discussing the similarities and discrepancies and their causes. The strengths and limitations of the study should also be reviewed in the discussion section, which could be about the selection of the sample population, research instruments, study design, intervention, and data collection methods. Afterwards, a few recommendations or suggestions could be provided.

Discussion must address a few questions: “What is the significance of the obtained results?” and “What are the applications of these findings?” Writing of the discussion is more difficult compared to the other sections of a paper, and certain points should be noted in this regard, including the avoidance of repeating the previous findings and elaborating on the correlation of the obtained results with the research question in the introduction part. The discussion is written in the present and past tense. The present tense is applied while reporting the current data (studies by other researchers), and the past tense is used while reporting the data and providing redundant information. Provide references to the tables and figures in the text; to refer to tables, the number of the table or figure could be mentioned between parentheses (e.g., Table 5), and refrain from using sentences such ‘The information are completely provided in Figure 2’. Do not mention similar data in the tables, figures, and diagrams. The results section is written in the past tense, with an active or passive voice. It is notable that the tables and graphs should be presented in accordance with the specific guidelines of journals.
discussing and assessing the new data (findings of the author)(4).

**Conclusion**

The conclusion section largely depends on the style and recommended format of journals; some journals consider a separate part for conclusion, in and some papers, it is the final paragraph after the discussion. In the conclusion section, the general idea of the article is presented briefly, and the significance of the findings are also emphasized(4,23).

**Acknowledgements**

Acknowledgements are one of the final sections of a paper. Some journals recommend an obligatory format for this section, while it could be an optional part in other journals. In the acknowledgements, the author appreciates the co-authors, financial supporters, affiliated institutions, and the cooperating organizations, as well as the other individuals who assist the author in conducting the research(4,22,24).

**References**

The number and format of the references depend on the style of journals. In the journals where there is a limited number of references, the author must adhere to the guidelines. In the references, the author must use new references as far as possible, which are relevant to the subject of the research. References must be arranged in accordance with the guidelines of the journal.

**Appendix**

Similar to the acknowledgments, the appendix may or may not be obligatory depending on the journal. In this section, the author provides all the information on the research, such as the applied questionnaires and complete images of the interventional processes(4).

**Overview of writing an article**

Writing a scientific article is a difficult task. According to Hayes, writing a scientific paper is a relative task that requires motivation, while it is also an intellectual activity that needs mental and cognitive processes (34). To begin every task, there should an overview and proper planning, which provide information on the following stages of the task. As such, planning is required before writing an article in two stages; initially, the author should address five questions, and in the second stage, 12 questions must be addressed (tables 3 & 4). Based on these questions, the author follows the steps to writing an article(30).

<table>
<thead>
<tr>
<th>Table 3. First overview of writing an article</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the title of my article?</td>
</tr>
<tr>
<td>2. Why is this title important?</td>
</tr>
<tr>
<td>3. How can I present my hypothesis?</td>
</tr>
<tr>
<td>4. What are my results?</td>
</tr>
<tr>
<td>5. What are my foremost findings?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4. Second overview of writing an article</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
</tr>
<tr>
<td>1. Why is my paper important?</td>
</tr>
<tr>
<td>2. What is the current data on my topic?</td>
</tr>
<tr>
<td>3. What is my research question/hypothesis?</td>
</tr>
<tr>
<td>4. What are my objectives?</td>
</tr>
<tr>
<td><strong>Materials and Methods</strong></td>
</tr>
<tr>
<td>1. What instruments have I used?</td>
</tr>
<tr>
<td>2. Who are my sample population?</td>
</tr>
<tr>
<td>3. What type of study have I used?</td>
</tr>
<tr>
<td>4. What was the methodology?</td>
</tr>
<tr>
<td><strong>Results</strong></td>
</tr>
<tr>
<td>1. What are the significant findings of the research?</td>
</tr>
<tr>
<td>2. What are the key findings of the study?</td>
</tr>
<tr>
<td><strong>Discussion and Conclusion</strong></td>
</tr>
<tr>
<td>1. What are the important findings?</td>
</tr>
<tr>
<td>2. What conclusion was drawn from the results?</td>
</tr>
</tbody>
</table>
References
