

Readability of English Articles Published in Iranian Medical Journals and Their Comparison with Articles Published in English and American Medical Journals in 2018

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Abstract

Background: Readability is one of the critical factors in choosing a suitable text to teach the students or ordinary people. Studies have shown that the readability of a text depends on the number of citations, type of article, journal impact factor, and journal scope. This study aimed at determining the readability in the most widely cited original English articles published in Iranian Medical Journals in 2018 and comparing them with the same type of articles in British and American Medical Journals; we also sought to determine the association between the level of readability of articles with the journal's impact factor (IF) and the total number of citations.

Methods: In this cross-sectional study, according to the search conducted in the database of the Iranian Journal of Medical Sciences, we searched different databases of ISI journals, and the results showed us 80 journals. We selected one American and one British journal for each Iranian journal, which was similar in terms of the journal's scope and impact factor. Then, the most cited original article in the latest issue of 2018 in each journal was extracted for review. Afterwards, we recorded five indicators of Iranian, American, or English journals, Impact Factor, number of citations to the article, journal's scope, and GFI score in a data collection form. The obtained data were analyzed using SPSS version 25.

Results: Comparison of mean Impact Factor, number of citations to articles, and GFI score between the three Iranian, English, and American Journal groups was statistically significant ($P < 0.05$). Iranian journals' low GFI score of articles has caused the articles to be less cited ($P = 0.022$).

Conclusion: The mean readability score of articles published in Iranian journals seems to be lower than that of American and British journals. The low level of readability score has a direct correlation with the low number of citations to articles.

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Introduction

Readability is one of the key factors in choosing a text suitable for teaching the university or school students or ordinary people.¹ The readability of a text may determine the achievability of the author's goal. The readability of a text depends on both the length of sentences and words and the text's attractiveness to the reader. This term indicates the complexity of the writing style in a text and the level of education needed to understand it.²

Studies have shown that scientific articles readability may be correlated with the author, article, and journal's impact factor.³ Other studies have shown that the readability also depends on the author's first language,⁴ country of affiliation,⁵ number of citations,⁶ year of publication,³ type of article,⁴ and the journal scope.⁷ In his study, Roberts has shown that the editorial team and the review process may also improve the readability of scientific articles.⁸

According to recent studies, the readability and eloquence of scientific articles are decreasing, and this trend is increasing. Researchers and the public should consider this trend since readability and eloquence affect the reproducibility and accessibility of the findings.³

Researcher have introduced various indices for evaluating textual readability. Thus, five indices of Automated Readability Index, Coleman-Liau Index, Flesch-Kincaid Graden Level, Simple Measure of Gobbledygook Index, and the Gunning Fog Index (GFI) which are available on websites for this purpose. These indices create approximately similar outputs that specify the level required to understand the desired scientific text. The Gunning Fog Index (GFI) is the most common index to evaluate the readability of journal articles.⁹

In their study in 2018, Andy et al. examined the readability of 100 of the most widely cited neuroimaging articles ever published. They calculated five indicators of Automated Readability Index (ARI), Coleman-Liau Index (CLI), Flesch-Kincaid Grade Level (FGL), Gunning Fog Index (GFI), and Simple Measure of Gobbledygook Index (SMGOI) for the texts of their selected articles. They investigated the association between the readability of these articles with the number of authors, corresponding author's country, the total number of citations to the article, type of article, year of publication, impact factor (IF), and journal scope. They observed that the readability of the articles' original text was greater than that of their abstract and empirical and methodological articles were more readable than review articles and meta-analyses. In addition, articles published in journals with higher IF were less readable.⁹

In 2011, Gazni & et al. addressed whether abstracts

of articles published in journals with higher IF were more readable or not. They extracted 26,000 articles published from 2000 to 2009 from five reliable scientific organizations and calculated the Flesch reading ease (RE) for the abstract of these articles. Then, they examined the readability of abstracts, compared the readability of different abstracts considering the year of publication; and finally, they investigated the association between the level of readability of abstracts and journals' IF. They found out that academic writers make the texts of their articles challenging to be comprehended and the medical and chemistry texts had the lowest readability among the studied articles.⁶

Considering the importance of the scientific articles readability, the researchers aimed to determine the readability in the most widely cited original English articles published by the Iranian Journals of Medical Sciences approved and registered by the Iranian Ministry of Health in 2018. They compared articles published in Iranian journals with the same type of articles in English and American clinical journals; moreover, they investigated the association between the journals' readability, the journal's impact factor, and the total number of citations.

Methods

In this cross-sectional study, we searched the Iranian Journal of Medical Sciences databases at <http://journals.research.ac.ir/> for ISI journals. We selected all 80 ISI journals found in the database as sample. Then, the IF and scope of each journal were identified. An American and a British journal were selected for each Iranian journal considering the IF and journal's scope. The American and British journals were searched at the United States Medical Journals list (<https://www.omicsonline.org/medical-journals-united-states/>) and the United Kingdom Medical Journals list

(<https://www.omicsonline.org/medical-journals-united-kingdom/>), respectively. If the desired journals were not open access and articles could not be accessed freely, we purchased the article. Whenever we reached two or more similar journals when selecting the American and British journals, we performed online randomization.

Therefore, we obtained 80 Iranian medical journals, 80 American medical journals, and 80 British medical journals, i.e., 240 journals were our sample size. Then, the most cited original article in the latest issue of 2018 in each journal was extracted. Next, we recorded the indicators of Iranian, American or British journals, impact factors, number of citations, journal scope, and GFI score in a data collection form.

After that, We used a free online program

Table 1: Comparison of the mean IF between the three Iranian, English, and American journal groups

| Type of journal | Mean±standard deviation | P value |
|-----------------|-------------------------|---------|
| Iranian * | 0.41±0.79 | 0.010 |
| American | 0.71±0.82 | |
| English | 0.75±0.69 | |

*Stands for a statistically significant difference between Iranian and American journals (P=0.035)

Table 2: Comparison of the number of citations between the three Iranian, English, and American journal groups

| Type of journal | Mean±standard deviation | P value |
|-----------------|-------------------------|---------|
| Iranian | 3.08±3.10 | 0.001 |
| American * | 4.50±4.30 | |
| English | 1.87±5.60 | |

*Stands for a statistically significant difference between American and English journals (P=0.001)

Table 3: Comparison of the GFI score between the three Iranian, English, and American journal groups

| Type of journal | Mean±standard deviation | P value |
|-----------------|-------------------------|---------|
| Iranian | 14.72±1.63 | 0.046 |
| American | 15.09±2.01 | |
| English * | 15.52±2.41 | |

*Stands for a statistically significant difference between English and Iranian journals (P=0.036)

called readability calculator at <http://www.gunning-fog-index.com/> for calculating GFI. Then, we interpreted the obtained numbers according to the GFI interpretation table.⁹ The obtained data were analyzed using SPSS, version 25. ANOVA test was used to compare the means among the three groups and Pearson correlation coefficient test was used to investigate the correlation between GFI score and journal IF and the number of citations.

Results

This cross-sectional study evaluated 240 journals, including 80 Iranian journals, 80 British, and 80 American journals. Tables 1, 2, and 3 show the Impact Factor (IF), the number of citations to the article, and the GFI mean scores.

According to Table 1, a higher mean IF of the American Journal compared to Iranian ones was

Table 4: Correlation of GFI score with the IF between the three Iranian, American, and English journals

| Type of journal | r (P value) |
|-----------------|----------------|
| Iranian | -0.076 (0.502) |
| American | 0.032 (0.778) |
| English | -0.192 (0.088) |

Table 5: Correlation of GFI score with the number of citations between three Iranian, American, and English journals

| Type of journal | r (P value) |
|-----------------|----------------|
| Iranian * | 0.255 (0.022) |
| American | 0.148 (0.195) |
| English | -0.028 (0.805) |

*The low GFI score and the low number of citations to the articles in Iranian journals were found statistically significant

found statistically significant. Moreover, a higher number of English journals citations compared to the American journals was statistically significant (Table 2). In addition, the higher mean GFI score of English articles in comparison with was also statistically significant (Table 3).

The correlation between the GFI score and the two variables, including the Impact Factor and the number of citations, were investigated using the Pearson correlation coefficient test. Tables 4 and 5 show the results.

Table 5, shows that low GFI scores in Iranian journals led to their lower citations.

Discussion

The present study compared the readability of English articles published in Iranian medical journals with American and British medical journals in 2018. This study hypothesized that the higher readability of writing is directly associated to the journal's Impact Factor.

The analysis of 240 English medical journals, including 80 Iranian journals, 80 British journals, and 80 American journals, revealed that there was only a correlation between the GFI score and the number of citations in articles published in Iranian journals; the lower the readability of the article, the lower the number of citations to that specific article.

Marc Berninger et al. have stated that one factor leading to the increased number of citations to an article is the ease of understanding and reading it although the reliability of an article does not guarantee the increased number of citations to the article.¹⁰ Bubela et al. believe that lower readability of

an article means less accessibility and consequently fewer citations to the article, especially by specialists. Consequently, scientists and researchers think falsely that by lowering the readability level, the text will be more understandable to the public.¹¹ Then, based on the results of our study and given the previous studies, it can be interpreted that a lower readability of writing will lead to the fewer citations to the article.

The results of our study revealed that the mean GFI score in Iranian journals was slightly lower than that of American and English journals, indicating lower readability of Iranian articles. Of course, this is not somewhat unexpected since most articles published in Iranian journals have been written by Iranian authors, who are non-native, and English is their foreign language. In her study, Tabatabaei investigated the level of readability of high school students' textbooks. She concluded that the readability of the material was not appropriate for the students' understanding and age.¹² In their study, Zarea Gavvani & et al. addressed the readability level of Iranian pharmaceutical brochures using the Flech index. They suggested that a significant number of Iranian drug brochures had low readability, and they were not suitable for a general and non-specialist audience. Due to the high cost of treatment, patients tend to use over-the-counter and non-prescription drugs. Hence, this study revealed that high readability levels are essential for patients tending to use non-prescription drugs.¹³ Thus, it seems that the readability of the scientific material written by Iranian authors is not acceptable and standard.

One of the limitations of the present study was that, based on the method used, we aimed to choose an American journal and an English journal corresponding to every Iranian journal in terms of scope and Impact Factor. A large percentage of Iranian journals with ISI profiles was Emerging; whereas no emerging journal was found between American and English journals. This is the reason why the corresponding journals were selected with the lowest Impact Factor while the average impact factors were different, particularly between the American and Iranian journals.

Conclusion

This study revealed that the average readability of articles published in the Iranian journals is lower than that of the American and English journals. The low level of readability directly correlated with few citations to the articles. Therefore, it is recommended to hold Standard English article writing courses for the scholars and authors of scientific articles seeking to disseminate

their findings to a broader audience and review and edit the authors' essays by native speakers to enhance the readability of articles to an acceptable level.

Conflicts of interest: None declared.

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