Pará Research Medical Journal

Medicina

RESEARCH ARTICLE

Has article title relation with the number of citations in Brazilian medical literature?

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Summary: **Purpose:** To assess the importance of the title structure on the citation rate in Brazilian literature. **Methods:** All the original research articles published in five Brazilian medical journals were analyzed. The numbers of citations of each article was retrieved from Google Scholar and each title was placed into one of the three groups: 1) titles describing the research methods/design (methods-describing title); 2) titles describing the results/conclusions (results-describing title); and 3) titles that were non-classifiable. Number of words and characters; reference to a geographical area; use of a hyphen or colon; mentioning of drugs; and description of study design were extracted. **Results:** There were 442 (88.4%) methods-describing titles, 43 (8.6%) results-describing titles, and 15 (3%) questions titles. The number of citations for the group 1 was significantly less than the number of citations for group 2 and group 3 articles ($p<0.05$). There were no correlations between the number of characters and words in the title and the numbers of citations. Titles referring to a specific geographical region were significantly more cited than titles that did not reference a geographical region. **Conclusion:** The structure proposing a question, along with the results-describing titles were found to be relevant for a high citation rate nationally since it facilitates the literature review. The presence of a specific geographical location on the title also proved to be significant probably due to a great regionalization of diseases in Brazil.

Keywords: title; articles; citations; journals; word count; impact of article.

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Financial support: None.
Conflict of interests: The authors declare no conflicts of interest.
Received: September 26, 2018
Accepted: March 13, 2019

Study carried out at Laboratório de Cirurgia Experimental, Universidade do Estado do Pará – UEPA, Belém, PA, Brasil.

Introduction

Several factors influence the citation rate of an article, such as its relevance, study design and quality. However, others factors non-related to the article are critical in the number of citations earned, such as: journals which the papers were published, the research group and institution that performed it[1]. These last factors are unfortunate when we consider good articles written and performed by less known authors and institutions.

Simkin and Roychowdhury[2] found that in about 20% of cases, articles were cited without being read: they were basically copied from the reference lists of other similar articles. In this context, Volpato[3], along with Ball[4] tried to identify certain title characteristics that would lead the article to be more often captured and quoted, such as titles containing good keywords, findings being expressed explicitly, motivating features for the readers, or providing a summary of contents.

The title is the most important element of a scientific article, usually the first or only information obtained from the publication, being fundamental for judgment calls regarding the quality of the paper[5]. Those performing literatures, the most diverse types of scientific databases[6] find the title to be the forefront of the paper and must arouse curiosity in readers, leading them to explore and use it as a reference for further research[7].

According to the authors of the Annals of Internal Medicine, "[…] researchers must choose titles that stimulate the interest of readers, are easy to read and concise (12 words or less)"[8]. The number of characters/words, the title formatting, presence of subtitle, characterization of the design/procedures, or even the geographical locations where the project was performed, are variables that may influence the number of citations of an article[9]. Some have already been studied and proved to be relevant in international journals[5,10,11].

Despite guidelines of how to better construct a title[12,13], authors are still failing on this task[14]. So, elaborating a title is one of the greatest challenges faced by authors. Several factors should be considered for higher chances of citing publication in scientific circles. Among these factors, it is highlighted the title length, reference to a geographical area, use of a hyphen or colon, mentioning of drugs and description of study design[15].

In juridical and biomedical literature, the majority of articles published and cited were influenced by these variables[4,9,16]; however, there is a lack of studies addressing the same topic in the Brazilian biomedical literature. Therefore, this study aims to assess the importance of the title structure in the paper citation rate in Brazilian manuscripts.

Methods

Selection of journals

From the list of Brazilian's journals of medicine with impact factor, according to the Journal of Citation Reports®[17], five of twenty-five medical journals were randomly selected, using a computer system. The journals selected were Acta Cirúrgica Brasileira, Arquivos Brasileiros de Cardiologia, Clinics, Memórias do Instituto Oswaldo Cruz e Revista da Associação Médica Brasileira.

All original research articles published in 2009 were analyzed. Articles classified as case reports, commentary, editorials and letters to the editor were excluded from the analysis. A three year period from the articles' date of publication to the analysis was considered to be a sufficient amount of time to measure the impact of a specific article in the scientific community[1].

Metric analysis

The numbers of times the article was cited according to the Google Scholar were collected on December 2012. The reason we choose Google© Scholar citation numbers for our metrics analysis is due to the fact that Brazilian literature is not cited as often as other international ones, such as Americans journals. So, we decided to use the database that has the greatest number of journals indexed[18] to get a fair comparison to what was found internationally.

The analysis of the title was based on a protocol from Paiva et al.[16], adapted to the Brazilian reality. The following information were collected from the articles: (1) number of words and characters; (2) reference to a geographical area (i.e. city, state, country or region); (3) use of a hyphen or colon separating different

ideas within a sentence; (4) mentioning of drugs; (5) description of study design (i.e. cross-sectional, coorte); and (6) Question-based titles.

The titles were divided into three distinct groups: (1) titles describing the research methods/design (methods-describing title); (2) titles describing the results/conclusions (results-describing title); and (3) titles that were non-classifiable. Two of the authors independently analyzed the titles to assign these in groups. In case of disagreement, a third author defined the final classification.

Statistical analysis

The data is presented as mean and standard deviation (SD). The comparisons between article title features and visibility were performed using the nonparametric Mann-Whitney U test and Kruskal-Wallis test, followed by Dunn's multiple comparison post-test. Spearman's coefficient test was used to investigate the relationship between the number of characters in the title and the view and citation counts. The statistical analyses were performed using BioEstat® 5.3 (Belém, PA, Brazil). A p-value less than 0.05 was considered statistically significant.

Results

In total, 500 article titles were included in the analysis; the article distribution, according to journal, is described in Table 1. The mean (SD) number of citations were 5.39 (5.67). The mean (SD) number of title characters and words were 102.34 (33.92) and 13.92 (4.71), respectively. There was no correlation between the number of characters or the number of words in the title and the numbers of citations ($r=0.0577$, $p > 0.05$ and $r=0.0808$, $p>0.05$, respectively).

There were 442 (88.4%) methods-describing titles, 43 (8.6%) results-describing titles, and 15 (3%) non-classifiable titles. The mean number (SD) of citations for group 1 was 5.10 (5.16), for group 2 was 7.62 (7.77) and for group 3 was 10.06 (11.18). The number of citations for the group 1 was significantly less than the number of citations for group 2 and group 3 articles ($p<0.05$).

Titles referring to a specific geographical region were significantly more cited (n=76, mean 6.52 ±6.80) than titles that did not (n=424, mean 5.23 ±5.44) ($p=0.0208$). Article titles with two components separated by a colon or a hyphen (n=113, mean 5.89 ±6.81) had no difference of citations rates compared with titles that did not include these components (n=387, mean 5.24 ±5.29) ($p=0.5536$).

Titles showing the study design (n=65, mean 6.21 ±7.34) had no difference in citation rates compared to titles that did not explicit study details (n=435, mean 5.27 ±5.38) ($p=0.5037$). The presence of drug names on the title (n=57, mean 4.29 ±4.31) had no impact on citations ($p=0.1093$). The presence of a question mark in the title had impact on citations rate ($p<0.05$ – 10.18 ±7.89 *vs* 6.46 ±6.37).

Table 1. Selected journals with their respective numbers of articles analyzed and impact factors

Journal	N	IF*
Acta Cirúrgica Brasileira	74	0.584
Arquivos Brasileiros de Cardiologia	64	0.880
Clinics	134	2.058
Memórias do Instituto Oswaldo Cruz	135	2.147
Revista da Associação Médica Brasileira	93	0.771

*Impact factor (IF) according to JCR Science Edition 2011.[19]

Discussion

The results of this study have confirmed the hypothesis that certain features related to the title of a scientific article appear to be related to the number of subsequent citations it receives, these data providing potentially useful guidelines for authors of future papers.

The association between the title length and citation rate is shifting; Some authors found a positive correlation – stating that the use of specific word, such as cancer, trial, survival, improve the citation. However, other authors found a negative correlation and they advocate that shorter titles are easy to remember and understand, and if readers cannot understand a title, there is only a small chance that they will read the abstract or the full paper. However, the Brazilian analysis found no significant relationship between characters or words in the title and the citation rate. Although, the Brazilian papers had in mean a lower titles than papers publish in preview studies.

To our knowledge, all publish papers agree that titles described results or conclusions have a higher citation rates than titles described methods. Ultimately, what readers really want to know about a paper is its main results. Florence[20] describe that some papers were cited but not read and otherswere read but not cited. This practice increase the chance of a results-describing title be cite, although increase to the chance of a misconducted paper be cited too.

The presence of the geographic location had a statistically significant higher number of citations, contrasting to the international analysis that found an absent or a negative correlation. Given that Brazil has continental dimensions and socioeconomic differences, the regionalization of illnesses implies in different interests in according to a specific regions. Thus, specific diseases are more incidents or even exclusive of determined regions where most of the researches are concentrated; And in international journals, normally, the papers that cite a geographic location argue about negligent illness that have a lower citation rates; and limits the visibility of an article to specific readers.

The international expert guide "how to write a scientific masterpiece"[21] and the International Committee of Medical Journal Editors prohibits the use of colon or hyphen, cite of drugs or use of special word (@, !, ?, %, etc); however some authors found a positive correlation with the number of citation. That shows a necessity of a permissive editor recommendation of the used of authors' style, that could increase the citation rate. Although, these characteristics had no impact on the citation rates of the journals analyzed.

The use of question mark was related with a higher citation rate, opposing to the findings from Jamali and Nikzad[5] and Paiva et al.[16] publications. Empirically, to be a researcher requires curiosity. When reading a title structured as a question, the curiosity is certainly awakened. Thus, it might imply in a greater interest in reading the article as a whole, facilitating its memorization and subsequent use as a reference in the following papers.

While we are not suggesting that changing the title of an article in isolation will lead to more citations, in practice the importance of article titles is increasing for the following reasons. It is well-established that certain specific aspects of an item, advertisement or other object, including the specific words used to describe it, can have a marked effect on its uptake. Furthermore, given that scientific literature searches can now be performed electronically by anyone with access to the Internet via sites such as PubMed or Google Scholar, often using title searches, it is highly likely that the inclusion of these specific title modifications may lead to a greater likelihood that the article is identified and read, and hence cited.

Our study had some limitations. First, the limited amount of journals analyzed, meanwhile, the number of Brazilian journals with a minimum citation rate is poor, limiting the selection, we analyzed 20% of the impact factor Brazilian journal. The articles sampled might not represent those of all biomedical journals. Another limitation of this study is that it analyzed only features from article titles, although other parts of manuscripts are obviously of great importance, such as their scientific content. And, the comparison between this Brazilian and other international journals might be complicated, once international journals have a disproportionately greater number of readers and citation.

Conclusion

Some features of article titles can be used to predict the numbers of views and citations of Brazilian articles. Articles with titles containing a question mark and with references to specific geographical regions were cited more often. Titles summarizing research results or conclusions, which were cited more often than titles describing the research methods/design. The use of colon or hyphen, cite of drugs or use of special word have no impact on citation rates. The findings presented here could be used by authors, reviewers, and editors to maximize the impact of articles in the scientific community.

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