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Citations of Brazilian physical therapy journals in national publications

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ABSTRACT | Background: Quotations in Brazilian journals are mainly obtained from national articles (articles from Brazilian journals); thus, it is essential to determine how frequently these articles reference Brazilian journals. **Objective:** This study sought to verify how frequently national papers are cited in the references of three Brazilian physical therapy journals. **Method:** All references for articles published in *Fisioterapia em Movimento*, *Fisioterapia e Pesquisa* and *Revista Brasileira de Fisioterapia* between 2010 and 2012 were evaluated. In particular, the numbers of national articles and international articles (articles from international journals) cited in these references were determined. **Results:** A total of 13,009 references cited by 456 articles were analyzed, and 2,924 (22.47%) of the cited works were national articles. There were no significant differences among the three examined years. A total of 36 (7.89%) articles did not cite national articles, whereas 65 (13.25%) articles cited more national articles than international articles. **Conclusion:** On average, 22.47% of the works cited by the evaluated articles were national articles. No significant differences were detected among the three analyzed years.

Keywords: journal article; impact factor; bibliography.

HOW TO CITE THIS ARTICLE

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● Introduction

In recent years, there has been extraordinary growth in the publication of research articles, a phenomenon that can primarily be attributed to rapid expansion in the training of new researchers¹. Biomedical fields have directly contributed to this growth; in particular, physical therapy has played an important role in the recent surge in research publishing. For instance, the quantity of randomized clinical studies in physical therapy increased from 1,950 in 1990 to 5,301 in 2010; moreover, in 2011, a total of 15,293 such clinical studies were ongoing^{2,3}.

The growth of research in physical therapy is of paramount importance because this research not only enhances knowledge and enables the standardization of procedures but also confirms or refutes experiences that occur in professional practice⁴; ultimately, this research contributes to improving patients' quality of life.

The evaluation of scientific journals is based on impact factor, which is calculated using the relationship between the total number of citations of

a journal over the course of a two-year period and the quantity of articles published in the journal in question during the same period. Notably, this metric does not directly evaluate the published articles but only assesses the number of articles published in a journal during a given time interval⁵.

Article citation can be biased due to several factors, including not only an article's title, research affiliations and scientific field but also the research group or specific researchers associated with an article^{6,7}. The citation of an article can also be affected by factors that are not directly related to the article itself, such as the database in which an article is indexed and the language in which an article is published. For instance, an article that is not published in English cannot readily be perused by the entire scientific community; instead, access to this article is restricted to researchers fluent in the language in which the article is published.

Brazil is the primary Latin American country in which physical therapy articles are published⁸. The

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current growth in publishing in this field can be partially attributed to the expansion of *stricto sensu*⁹ graduate programs offered by public universities, which has resulted in a ninefold increase in PhD graduates in physical therapy over the course of the prior 10 years¹⁰. However, this growth in the quantity and quality of publishing in the field of physical therapy has not been reflected by improvement in Brazilian journals¹¹. In fact, only three out of ten Brazilian physical therapy journals are indexed in SciELO (Scientific Electronic Library Online), and only one of these journals possesses an impact factor^{12,13}.

Although it has been established that the quality of Brazilian journals is rising, various factors continue to limit increases in the number of citations of these journals. For instance, publications in these journals are predominantly in Portuguese; international articles (articles published in international journals) are of higher quality than publications in these journals; and “brain drain” has led to the publication of leading Brazilian research in foreign journals¹⁴. These factors have restricted access to and citation of Brazilian journals¹⁵.

Therefore, the objective of this study is to assess how frequently national papers (papers published in Brazilian journals) are cited by evaluating the references of articles published in three Brazilian physical therapy journals.

• Method

The references of articles published in three Brazilian physical therapy journals (*Fisioterapia em Movimento*, *Fisioterapia e Pesquisa* and *Revista Brasileira de Fisioterapia*) were analyzed. All articles published from 2010 to 2012 were examined, although only articles describing “original research” were evaluated in this study.

The analyses of this study did not consider articles classified as editorials, literature reviews or case studies; articles without references; or letters to the editor. Literature reviews were excluded because they reference articles with a high impact factor, which are primarily international articles. Therefore, the consideration of literature reviews would bias the selection. Articles that satisfied or violated the inclusion criteria were analyzed based on the references of national articles¹⁶.

In the search protocol of this study, all examined references were evaluated, disregarding references to

books or websites and secondhand (*apud*) references. The numbers of references to national articles and to international articles as well as the ratio between references to national articles and references to international articles were determined. For each article, this analysis was performed by one author and subsequently confirmed by another author. In cases in which the two authors’ analyses disagreed, the origins of referenced articles were verified using journals’ websites.

For each examined journal, the number of self-citations (references to national articles in the journal in question) was analyzed. The total numbers of citations for all three journals and the ways in which the origins of these citations related to not only the examined journals but also national journals as a whole were also examined. These data were obtained from SciELO for each journal.

The distribution of study data was verified using the Shapiro-Wilk test, which indicated that these data were symmetrically distributed. Analysis of variance (ANOVA) was used to compare the effects of intra- and inter-group factors on the ratio between the quantity of national articles cited and the quantity of international articles cited. The null hypothesis was rejected at $p < 0.05$. All data obtained in this study were analyzed using the BioEstat® 5.3 software program.

• Results

A total of 13,099 references cited in 456 articles from the three examined journals were analyzed. Thus, on average, 28.52 ± 8.43 references were assessed per article. Table 1 presents the average quantity of references per article for each examined year. In particular, this table indicates that in 2012, 2011, and 2010, there were 29.86 ± 9.08 , 28.05 ± 8.42 and 27.76 ± 7.67 citations per article, respectively. Among all of the examined references, 2,924 (22.47%) references cited national (Brazilian) articles; this value corresponded to an average of 6.41 ± 5.61 citations of national articles in each examined article.

Table 2 indicates data obtained for the three examined Brazilian physical therapy journals. For these journals, no significant differences among the three analyzed years were found with respect to the citation of national journals.

However, a significant difference among the three journals was found with respect to the quantity of citations of national articles. In particular, relative to

Revista Brasileira de Fisioterapia, Fisioterapia em Movimento ($p<0.001$) and Fisioterapia e Pesquisa ($p<0.001$) cited national articles at significantly higher rates. These p-values reveal that articles in Revista Brasileira de Fisioterapia cite national articles less frequently than articles in the other two examined journals.

Among all of the examined articles, 36 (7.89%) articles did not refer to any national articles, 65 (14.25%) articles cited more national articles than international articles, and two articles (0.4%) only cited national articles. No significant differences among the examined journals ($p=0.96$) or the analyzed publication years ($p=0.75$) were observed. Table 3 indicates the distribution of citations recorded in the SciELO database.

● Discussion

The production of scientific knowledge in Brazil is greatly increasing, with unprecedented levels of research with respect to both quality and quantity. However, this increase has not been appropriately reflected by publications in national journals^{11,17,18}.

On average, 22.47% of the references cited by the evaluated articles were national (Brazilian) articles. A literature review discovered no other studies that investigated the frequency with which national articles were cited in the field of physical therapy. Therefore, it was impossible to determine whether the average percentage of citations involving national articles has increased by comparing the 22.47% value obtained in this study with the findings of previous studies.

Table 1. Total articles and references analyzed and proportion of articles cited in the three national magazines according to years studied.

Year of publication	Articles analyzed	Percentage	Number of references	Percentage
2012	143	31,36%	4,270	32.82%
2011	167	36,62%	4,686	36.02%
2010	146	32,02%	4,053	31.16%
Total	456	100,00%	13,009	100.00%

Table 2. Total articles and references analyzed and proportion of articles cited in the three national magazines according to the years studied.

Fisioterapia em Movimento				
Year of publication	Total articles published	Number of references	Brazilian articles cited	%
2012	51	1,522	412	27.06%
2011	53	1,451	506	34.87%
2010	35	899	299	33.25%
Total	139	3,872	1,217	31.43%
Fisioterapia e Pesquisa				
Year of publication	Total articles published	Number of references	Brazilian articles cited	%
2012	40	972	282	29.01%
2011	48	1,192	285	23.90%
2010	47	1,222	323	26.43%
Total	135	3,386	890	26.28%
Revista Brasileira de Fisioterapia				
Year of publication	Total articles published	Number of references	Brazilian articles cited	%
2012	52	1,776	263	14.80%
2011	66	2,043	259	12.67%
2010	64	1,932	265	15.26%
Total	182	5,751	817	14.20%

Table 3. Distribution of quotes from the three journals.

Magazine	Self-citation	Quote the Brazilian physical therapy's periodic	Quote the Brazilian journal	Total quotes
FEM	107 – 2.76%	304 – 7.85%	1.217 – 31.43%	3,872
FEP	33 – 0.97%	221 – 6.52%	890 – 26.28%	3,386
RBF	245 – 4.26%	297 – 5.16%	817 – 14.20%	5,751
Total	385 – 2.95%	822 – 6.31%	2,924 – 22.47%	13,009

Values are expressed in absolute totals and in percentages relative to total citations. FEM: Fisioterapia em movimento; FEP: Fisioterapia e pesquisa; RBF: Revista Brasileira de Fisioterapia.

However, the obtained average may be compared with the results presented by Teixeira et al.¹⁶, who examined three surgery-related Brazilian journals and determined that on average, 11.65% of the articles cited by papers in these journals were national articles. Thus, it can be inferred that the authors of Brazilian physical therapy articles cite national articles more frequently than Brazilian surgeons¹⁹. This difference may be attributed to the fact that more international journals are available in surgery than in physical therapy; as a result, the probability of citing international articles rather than national articles is greater in the former field than in the latter field.

Several factors restrict the citation of Brazilian articles in international journals. First, numerous Brazilian researchers publish only in Portuguese; as a result, their articles cannot be read and cited by researchers in many other nations. Moreover, several articles can only be accessed through local platforms, such as Lilacs^{20,21}; this limitation constitutes another obstacle that restricts access to these articles. Among the examined journals, only Revista Brasileira de Fisioterapia publishes all of its articles in English; unsurprisingly, this publication is also the only journal with an impact factor^{13,14}.

Another factor that limits the citation of national articles is research quality. Many contributions to Brazilian journals involve the use of small samples to describe local phenomena; therefore, no extrapolation from the results of these studies is possible. Large national studies, such as multicenter clinical trials, are typically published in international journals, resulting in a “brain drain” in which the highest-quality national articles typically contribute to the impact of international journals rather than Brazilian journals²²⁻²⁴.

It is necessary to perform more studies to determine whether a Brazilian researcher cites national articles in similar ways in articles published in national and international journals. These studies would enable the investigation of correlations involving impact factor, allowing researchers to discover whether a

relationship exists between the quality of a journal and the quantity of national articles cited by publications in the journal in question.

• Conclusions

On average, 22.47% of the references cited by the evaluated articles were national (Brazilian) articles. No significant differences among the analyzed years or the examined journals were detected.

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