Self-citation of Medical and Non-medical Universities in Northern Iran

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ABSTRACT

Background: Self-citation is one of the main challenges in the evaluation of researchers' scientific output. This study aimed at comparing the institutional self-citation among the universities located in Northern Iran. **Methods:** This study was conducted as a scientometric study. Research population included all scientific productions of 16 Northern Iran Universities with at least 100 indexed documents indexed in the Web of Science (WoS) by 2 June 2015. The citation analysis section of WoS was used for data collection. SPSS was applied for data analysis. Study hypotheses were tested with two independent sample t-test and paired sample t-test. **Results:** Producing 16,399 papers, northern Iran universities had 5.33% of contribution in Iran's scientific production. They received 84,058 citations with 17% and 12% of self-citations belonged to the non-medical and medical universities, respectively. Testing hypotheses revealed that increase in received citations significantly increases the rate of self-citation and increase in scientific production does not necessarily increase the rate of self-citation. **Conclusion:** The rate of self-citation in the studied universities was not relatively high. However, investigating into the factors affecting the rate of and motives for self-citation needs further research.

Keywords: institutional self-citation, scientific output, universities, Northern Iran.

1. INTRODUCTION

As one of the indicators of scholarly writing and communication, "citation" has a main role in the production and dissemination of scientific information. Citation is one of the most obvious manifestations of using information resources and represents the use of information embedded in other resources in writing a scholarly paper (1). It shows authors' habits, attitudes and behavior in the use of previous researches (2). As one of the citation kinds, "self-citation" means that an author cites his/her previous paper(s) in the paper at hand. This is accurately the "author self-citation". There are some kinds of self-citations including among others institutional, language, country and discipline self-citations, as well (3) and they were studied in previous literature.

Author self-citation can be seen in two forms: Synchronous and diachronous (4). The former is the citation an author gives to his/her previous papers in his/her paper at hand. In other words, synchronous self-citation is measured as the percentage ratio of citations given

by an author to his/her previous works to all citations in the paper at hand. For example, if an author publishes a paper with 5 citations of which 2 papers belonged to him/her, the ratio of his/her synchronous self-citation would be 2/5 or 40%. The diachronous self-citation refers back to the ratio of author self-citation to a paper of him/her to total citations received by the paper at hand. For example, if one of 5 citations that a paper receives belongs to its author, the ratio of the diachronous self-citation would be 1/5 or 20% (5). Measuring this citation necessitate one accessing the citation indexes.

On the other hand, it is impossible to determine whether or not a given citation has been needed and rational. However, some quantitative indicators are used for measuring the self-citation rate (6). In spite of the lack of consensus on the acceptable rate of self-citation, Institute for Scientific Information (ISI) conceives the self-citation rate less than 20% as an acceptable rate and does not assign any impact factor for a journal with the self-citation rate more than

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20% (7). In some international journals, the self-citation is encouraged as it results in the increase of the journal's impact factor. The issue of its being ethical or not was studied and debated (8, 9). Some researchers believe that rational self-citation is necessary, since high self-citation causes an unreal increase in h-index of researchers and research institutions in a long time (10, 11). Some argue that as researchers are human-beings, this kind of citation will not be changed (7).

In addition, when a researcher is working on a continuous research project, it is often needed to cite his/her previous related papers for detailing the topic at hand. This self-citation is a helpful and useful one (12). As a result, it can be concluded that discussion on self-citation has been controversial.

The studies on the state of self-citation among Iranian researchers and scientific journals showed its expansiveness in all academic disciplines, including among others library and information science (2) and medical sciences (13). In case of Iranian medical journals in Persian, the rate of self-citation was 61.5% (14). The average rate of self-citation among the Iranian prolific authors in medical field was 26% (15).

The comparison of journal self-citation rates between Iran and Turkey's authors in the time span of 2000-2005 showed that in the case of Iran, this rate increased from 8% at 2000 into 18% at 2005 and in the case of Turkey, the rate decreased from 22% at 2000 into 15% at 2008 (16). The comparison of Iranian and non-Iranian researchers' self-citation rates showed that the former with 3.14 average rate had a different self-citation behavior from the latter with the average rate of 1.44 (17).

In addition, as a common trend, the institutional self-citation is considerable among research organizations. The study on the self-citation rate in 96 top American academic research institutions in the three-year time span of 2007-2007 showed that the rate of self-citation among these institutions was 19% in total and the highest rate was 29% in the first year of publication and changed into 19% in the subsequent years, respectively (18).

In the case of Iran, self-citation rates among academic research institutions have not ever been measured. This type of study is needed to determine the average rate of self-citation in Iran's academic research institutions. Aiming at investigating this subject in northern Iran's universities, this study attempted to test the following hypotheses:

There is a significant difference in the average rates of self-citation between northern Iran's medical versus non-medical universities.

There is a significant relationship between the citations received and the self-citation given in the studied universities.

There is a significant relationship between the papers published and the self-citation given in the studied universities.

2. METHODS

This study took a scientometric approach. The research population included all scientific papers published under the affiliation of northern Iran's 16 universities (including 6 and 10 medical and non-medical universities, respectively). The criterion of selecting the universities was their presence in the Web of Science (WoS) and universities without any indexed paper(s) in the WoS by 2 July 2015 were excluded from the study.

For retrieving the papers, the word "Iran" was searched in the address field and the results were restricted to the name of each of the selected universities in the section "refine". Then, extracted data from the "citation report" section of the database was imported to Excel and analyzed by using SPSS.

3. RESULTS

Total amount of 246,167 papers under the name of "Iran" have been indexed in the WoS by 2 June 20015. The Islamic Azad University with 33,686 published papers, Tehran University with 24,092 published papers and the Tehran University of Medical Sciences with 18,103 published papers were ranked as universities with the highest productivity rates, respectively. These universities' contribution to Iran's scientific paper production was 30.81%.

Total amount of 16,399 papers were indexed in the WoS under the affiliation of the studied universities in Northern Iran. The highest ranks in producing scientific papers in Northern Iran belonged to Guilan University (with 3239 papers), Mazandaran University (with 2804 papers) and Semnan University (with 1859), respectively. The average rate of these universities' contribution to Iran's scientific production was 5.33% in total (4% for non-medical universities and 1.33 for medical universities). Table 1 shows the rate of scientific output by 5 northern Iran's top universities and their individual contributions.

No.	University	Number of papers	% of contributions to Iran's total scientific production
1	University of Guilan	3239	1.22
2	University of Mazandaran	2804	1.12
3	Semnan University	1859	0.75
4	Shahrood University of Technology	1501	0.60
5	Mazandaran University of Medical Sciences	1283	0.52

Table 1. The number of papers and the rate of contributions to scientific production by northern Iran's top universities

The six medical universities located in Northern Iran have published 3373 papers that received 14587 citations, of them 1795 were self-citations. The ratio of citations to self-citations was 12% in these universities. The h-index in the field of medical science in these universities was 21 and the mean rate of citations to papers was 23.56. As Table 2 shows, the highest and fewest self-citation rates belonged to the Mazandaran University of Medical Science (with 15%) and the

University	Paper count	Total citations	Self-citations	h-index	Citation mean	Self-citation%
Mazandaran University of Medical Science	1283	6764	1065	33	5.27	15%
Guilan University of Medical Sciences	604	1713	156	18	2.82	9%
Babol University of Medical Sciences	543	1847	95	20	3.40	5%
Gorgan University of Medical Sciences	500	2351	326	23	4.70	13%
Semnan University of Medical Sciences	320	1633	113	19	5.10	6%
Shahrood University of Medical Sciences	123	279	40	8	2.27	14%
Sum	3373	14587	1795	121	23.56	12%

Table 2. The rates of citations, self-citations, and h-indices of scientific production by northern Iran's medical universities

Babol University of Medical Sciences (with 5%), respectively. The highest and fewest-index rates belonged to the Mazandaran University of Medical Science (with 33) and the Shahrood University of Medical Sciences (with 8), respectively.

The ten non-medical universities located in Northern Iran have published 13,026 papers that received 69,437 citations in total, of them 11,999 were self-citations. The ratio of citations to self-citations in these universities was 17%. The h-index in the field of non-medical science in these universities was 292 and the mean rate of citations to papers was 47.69. As Table 3 shows, the highest and fewest self-citation rates belonged to the Babol's Nooshirvani Industrial University (with 31%) and the Shahrood University (with 3%), respectively. The highest and fewest h-index rates belonged to the Mazandaran University (with 51) and the Shahrood University (with 10), respectively.

University	Paper count	Total vi-tations	Self-ci-tations	h - index	Citation mean	Self-ci-tation%
University of Guilan	3217	16751	960	46	5.21	5%
University of Mazandaran	2804	19809	3653	51	7.06	18%
Semnan University	1859	8279	2228	34	4.45	26%
Babol Nooshirvani University of Technology	1587	8994	2873	36	5.67	31%
Shahrood University of Technology	1501	6590	1317	32	4.39	19%
Golestan Agricultural and Natural Resources University	792	3722	355	26	4.70	9%
Golestan University	467	2364	316	21	5.06	13%
Sari Agricultural and Natural Resources University	353	1040	112	14	2.95	10%
Mazandaran University of Science and Technology	246	1515	170	22	6.16	11%
Shahrood University	200	407	15	10	2.04	3%
Sum	13026	69471	11999	292	47.69	17%

Table 3. The rate of citations, self-citations, and h-indices of scientific production by northern Iran's non-medical universities

For testing research hypothesis 1, regarding the existence of a possible significant difference between medical and non-medical universities concerning their self-citation rates, an independent sample t-test was used. As shown in Table 4, there was a significant difference between medical and non-medical universities in their self-citation in favor of non-medical universities ($t_{(n_1=6, n_2=10), df=14} = -1.640, p<.05$). Then, this hypothesis was confirmed.

Group	Citation count	Self-ci-tation count	Ratio of citation to self-ci-tation %	Self-ci-tation mean	df	T
Medical uni-versities ($n_1=6$)	14587	1795	12%	299.17	14	*-1.640
Non-medical universities ($n_2=10$)	69471	11999	17%	1199.90		

Table 4. The results of independent sample t-test for difference in the self-citation rates of medical versus non-medical universities

For testing research hypothesis 2 testing the possible significant relationship between the rates of received citations and given self-citations, a paired sample t-test was used. As Table 5 shows, there was a significantly positive relationship between the rates. In other words, universities with more received citations had more self-citations ($t_{(n=16), df=15} = 3.553, p<.01$).

Compared groups	means	Mean differ-ences	df	t
Received citations	5235.00	4390.875	15	**3.553
Given self-citations	862.13			

Table 5. The results of a paired sample t-test for relationship between the rates of received citations and self-citations in the studied universities

For testing the hypothesis 3 testing the possible significant relationship between the numbers of published papers (scientific productivity) and the rate of self-citations in the studied universities, again a paired sample t-test was used. As table 6 shows, there was no significant relationship between these two variables ($t_{(n=16), df=15} = .388, p>.05$).

Compared groups	Means	Mean differ-ences	df	T
Produced papers	1024.94	162.813	15	0.388
Given self-citations	862.13			

Table 6. The results of a paired sample t-test for relationship between the number of published papers and the rate of self-citations in the studied universities

4. DISCUSSION

Investigating the status of citations to the scientific output of medical and non-medical universities located in Northern Iran showed that of all citations (84,058), 16% (13,749 citations) were self-citations. As noted earlier that the rate of self-citations less than 20% is acceptable (7), it can be said that the rate of self-citedness in the studied universities was in suitable level. The rate of self-citation in some studies was reported to be more than the acceptable level, such as 29% in American research institutions (18) and 17.75% in the publication of American Psychology Association (19). Although the self-cited papers are assumed to help the explanation of theories, the formation of research questions and designation of research methods, irrelevant self-citation that could not help the author in his/her work or the readers in their understanding the context challenges the self-citedness and raises the question of citing these resources for increasing the citation count in a non-scientific manner (20).

The findings showed that the rate of self-citation in non-medical universities (with 17%) was more than that in medical universities (with 12%). This result can be explained in the light of the fact that the citation behavior depends on study fields, academic disciplines and the sociology of the science (4). Another reason may be that the more the citation count is, the more the self-citation count is. In the studied universities, non-medical universities had more received citations (with 69,471) than those of medical universities (with 14,587).

The percentage of self-citation rate in the field of medical sciences (with 12%) was less than that in non-medical sciences (with 17%) revealed that in line with the studies by Aksens (4) and Nowkarizi and Farkhari (21), the self-citedness depends on the subject of the study as well as researchers' study

interests. The confirmation of the hypothesis 1 in this study showing a significant difference between the mean rate of self-citation in medical universities and that in non-medical universities in the favor of the latter is a witness to this result. Ghane found that the rate of self-citation in the medical field was 65%, however (14).

Of the studied universities, the highly self-citing universities were Babol's Nooshirvani Industrial University (31%), Semnan University (26%) and Golestan University (13%), respectively and those with less self-citation were Shahrood University (3%), and Babol University of Medical Sciences and Gilan University (each with 5%), respectively. In the universities with higher self-citation rates, the rates of paper production were not necessarily in higher level. For example, despite its highest rate in self-citation among the studied universities, Gilan University had only 5% of self-citations. As a reserch ult, more paper production does not always increase the rate of self-citation (18). The confirmation of hypothesis 3 is another witness to this opinionin that no significant relationship was seen between published papers and self-citations.

5. CONCLUSION

Based on the results of testing research hypothesis 3, the increase in the rate of received citations was in parallel with the increase in the rate of given self-citations. There are controversial results concerning this issue. As a complex, but natural behavior (22), self-citation heavily depends on research topic, co-authorship network, study time spam and so on (23) and availability of all existing information resorces in libraries and information center (24). Further research is needed to study the self-citation and factors affecting it.

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