

The Altmetrics of Retracted Articles in Biochemistry & Molecular Biology

Shima Moradi

Faculty of Scientometrics, National research institute for science policy, Tehran, Iran.

E-mail address: Moradi@nrisp.ac.ir and shmoradi@gmail.com



Copyright © 2017 by Shima Moradi. This work is made available under the terms of the Creative Commons Attribution 4.0 International License:

<http://creativecommons.org/licenses/by/4.0>

Abstract:

Retracted articles are those papers with any kind of scientific misconducting rejected by publisher after publication date. This research is about retraction in 354 Biochemistry & Molecular Biology papers indexed in Web of science, to see if their traditional impacts has any relation with their modern. Using both scientometrics and altmetrics approaches, their citations and mentions is studied for 185 articles as the research sample. Results shows a growth in the retraction rate for this field, besides 67 citations and 263 mentions were calculated. There were no significant correlation between the traditional and modern impact of these articles; however, there were a correlation between traditional impact and Publication date as well as the modern impact and Publication date in these articles.

Keywords: Altmetrics, citation, mention, retraction, retracted publication, Biochemistry & Molecular Biology

Introduction

The science growth needs a quick and accurate assessment which is called scientometrics (Van raan, 1997). The new version of scientometrics in virtual academic world known as altmetrics, focuses on virtual presence of an academic output in web 2.0 tools like twitters, Facebook, blogs, Reddit, new. It gives you the whole idea about the influence of an individual research results in internet (Piwowar, 2013).

Many studies (Thelwall et al., 2013 ; Costas, Zahedi, & Wouters, 2015; Hammarfelt,2014),2014; Haustein et al., 2014; Buttlere & Buder, 2017) have looked for the relation between traditional and modern metrics to find if one can substitute the other and announce the best metrics assessing the impact of a research in science and there are many resources that reckon altmetrics, as an Article-Level Metrics (ALM) (Lin & Fenner, 2013), can reveal the impact of a research in a modern scholarly world (Piwowar, 2013).

It is worthy to mention that, there were many forms of scientific misconduct includes falsification, manipulation, plagiarism leads to retraction of an article by journals or publishers (Enago Academy, 2016; Wager et al., 2009). This is called “retraction” and it is strange that some of these retracted articles even got citation which means their messages have been distributed in the world already. This attempt focused on two variable of article retraction and impact in the Biochemistry & Molecular Biology (BioChem. & M.Bio.):

- A. Article Retraction: There are many studies about retraction from different points of view: the reasons caused the research miscounting like “publication pressure“ (Tijdink, Verbeke & Smulders, 2014) or different forms of misbehavior in researches (Fang, Steen & Casadevall, 2012; Noyori & Richmond, 2013; Noyori & Richmond, 2013; Gross, 2016; Ziliak, 2016; Sugawara et al, 2017), the growth of retraction in formal channel (Tijdink, Verbeke & Smulders, 2014; Couzin-Frankel, 2013; Fanelli, 2013), The phenomena of increasing the articles citations in the case of retraction (Pfeifer & Snodgrass, 1990; Budd, Sievert & Schultz, 1998), decreasing the citation after retraction happened (Furman, Jensen & Murray, 2012).
- B. Article Impact: There are many discussion about the real scientific impact of a study on the society via formal and informal channels, some called journal citation the “gold standard” evaluating the impact of an individual study (Neylon & Wu, 2009) while some indicates modern channels like twitter for distributing the findings of a paper (Sugawara et al, 2017; Faulkes,2014).

This is to study the retracted articles in BioChem. & M.Bio. using altmetrics to get their research impact over the internet to see if these articles had any influence on the scientific society or not.

Research Questions and Hypotheses

Here are the research questions:

1. What is the citation status of BioChem. & M.Bio. retracted articles in WoS?
2. What is the altmetric status of BioChem. & M.Bio. retracted articles in WoS?

And the hypotheses are:

1. Is there any correlation between the traditional impact and modern impact in BioChem. & M.Bio. retracted articles in WoS?
2. Is there any correlation between the traditional impact and Publication date in BioChem. & M.Bio. retracted articles in WoS?
3. Is there any correlation between the modern impact and Publication date in BioChem. & M.Bio. retracted articles in WoS?

Research Method

This study is about BioChem. & M.Bio. retracted articles indexed in web of science (WoS). This articles assessed their impact in traditional and modern scientific world however they have been retracted and it is kind of dangerous for science to cite or mention such a research which is vogue. The comparative study of their impact in science was studied using scientometrics methods as well as the characteristics of the mentions they got using altmetrics method, this means, the amount and channels they have been mentioned and referred were revealed in the virtual world. Last but not least, this study demonstrated the relation between the traditional (citation) and modern impact (mentions) of these retracted articles.

Searching for retracted scientific records in WoS, limited to BioChem. & M.Bio., There were 494 records amongst which 434 were retracted articles (Fig. 1). This was because there were some articles with the “retraction” in their title refers to the research methodology of that paper and should be excluded from the study. Retrieving articles virtual impact, the altmetric Bookmarklet (Trueger, et al., 2015) was used and this tool needs DOI to draw out data so 80

records without DOI were omitted too which came to 354 articles. Using Sample size calculator¹, 185 retracted articles were chosen randomly with 95% confidence level and 5% confidence interval and the randomizing process was done by excel 2013 formula. As for hypotheses the spearman correlation coefficient was calculated by excel 2013. As for Bibliometrics information, The citation counts was collected from WoS while the altmetrics extracted by altmetrics Bookmarklet (Trueger, et al., 2015).

Results

Q1. What is the citation status of BioChem. & M.Bio. retracted articles in WoS?

Findings shows that these articles got 67 citations in WoS which is 0.36 citation per articles. Figure 1 demonstrates citation frequency for these papers: 154 papers has no citation while 21 papers has 1 citations and in there is even one paper which got 12 citations.

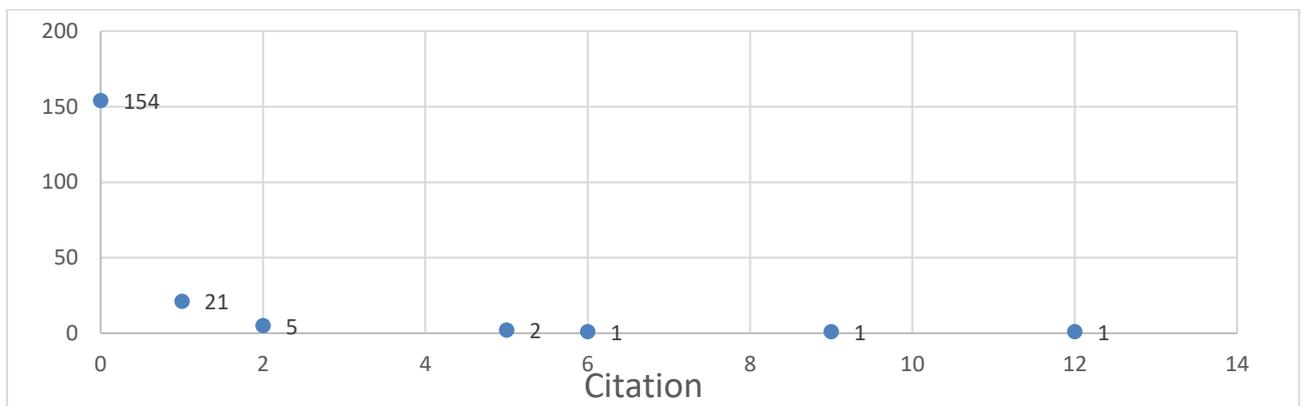


Figure 1. Citation frequency in BioChem. & M.Bio. retracted articles

Moreover, figure 2 shows that these papers had published from 1997 to 2016 and the most retracted papers were from 2007 and 2008 with 23 retracted articles, then in 2014 there was 21 retracted articles in this discipline. The fewest retraction is for 1997 with 1 articles and 1998 & 2016 with 2 retractions.

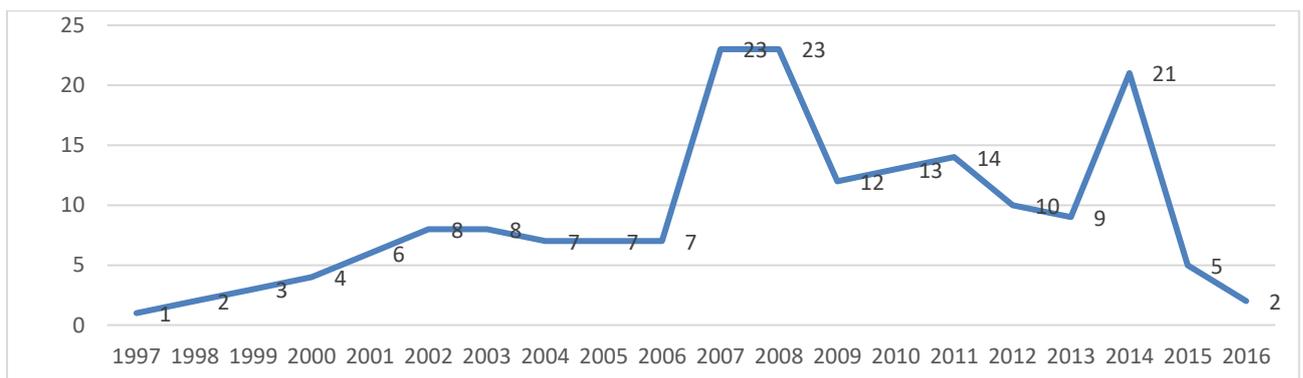


Figure 2. Publication date frequency in BioChem. & M.Bio. retracted articles

Q2. What is the altmetric status of BioChem. & M.Bio. retracted articles in WoS?

In regards to articles altmetrics data, these articles have been mentioned 263 times in 73 for Twitte, 70 blogs, 40 Weibo - a Chinese microblogging website-, 39 peer review sites, 14 news, 12 Wikipedia pages, 10 highlighted platforms, and 5 Facebook (figure 3).

¹ <http://www.calculator.net/sample-size-calculator.html>

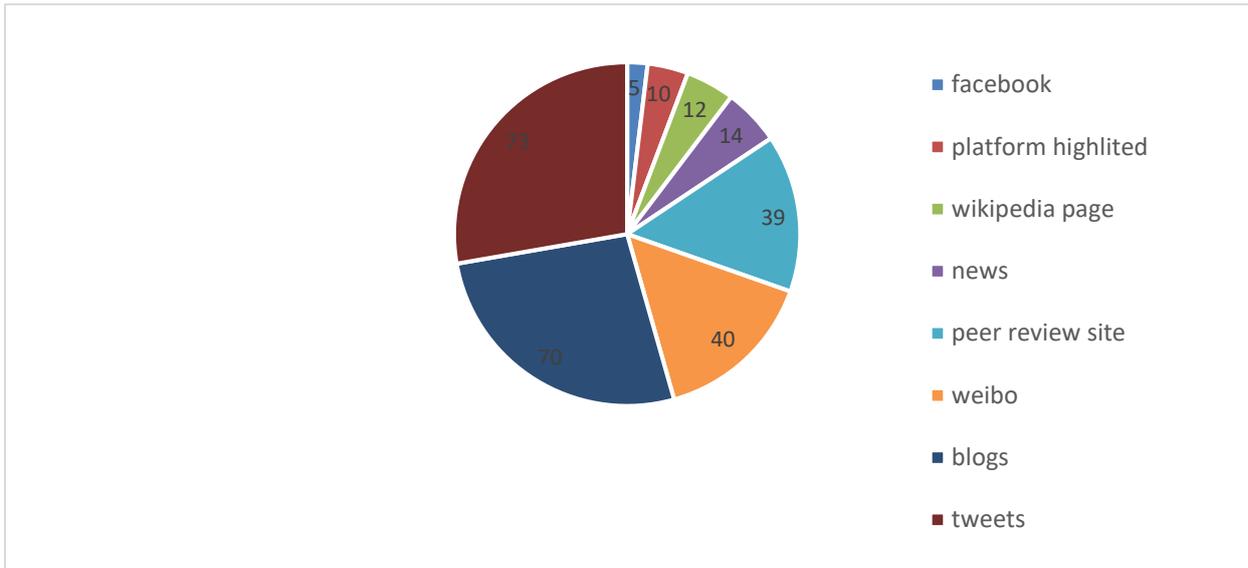


Figure 3. Altmetric frequency in BioChem. & M.Bio. retracted articles

In addition, the whole altmetric score for these articles is 792, which makes the average of 4.28 per article. Figure 4 reveals there are 99 articles which has not even scored while there is one article with 91 or 76 scores.

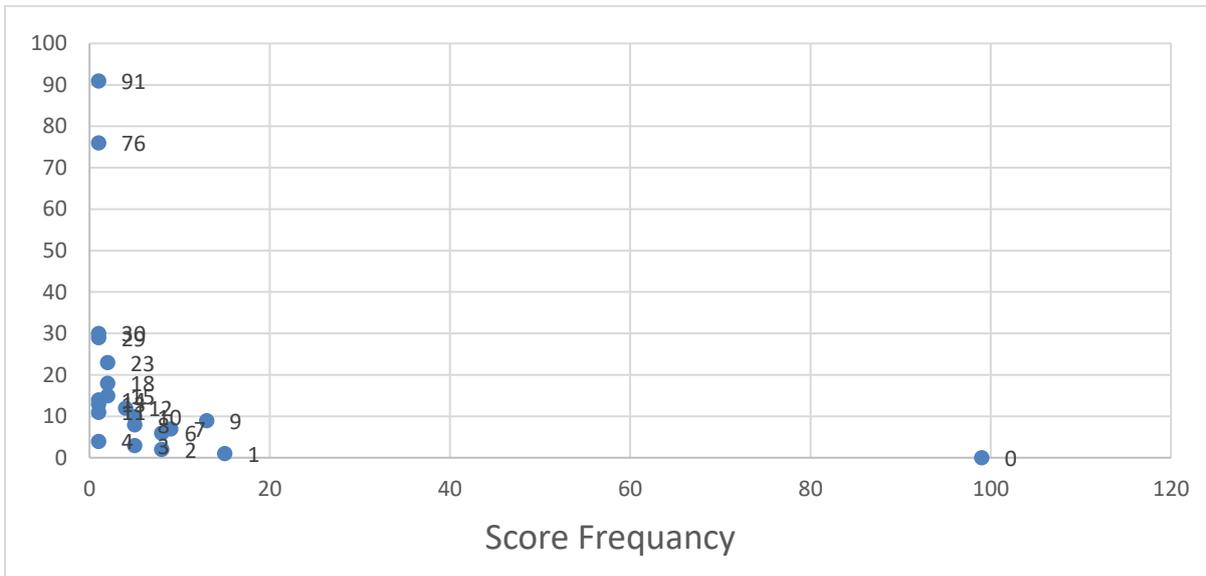


Figure 1. altmetric score frequency in BioChem. & M.Bio. retracted articles

H1. Is there any correlation between the traditional impact and modern impact in BioChem. & M.Bio. retracted articles in WoS?

According to table 1, the coefficient between these two variables was ($R=-0.008$) which was not signified ($p=0.917$) from the critical value ($r=0.165$) by 185 degrees of freedom. This means there is no significant correlation between the traditional and modern impact of these articles.

Table 1. Spearman correlation coefficient test between traditional impact and modern impact

Statistical features Test	coefficient	critical value	Degrees of freedom	Level of Sig.
Spearman correlation	-0.008	0.165	185	0.917

H2. Is there any correlation between the traditional impact and Publication date in BioChem. & M.Bio. retracted articles in WoS?

Table 2 demonstrates, the coefficient between these two variables was ($R=-0.188$) which was significantly negatively lower than the critical value ($r=0.165$) by 185 degrees of freedom with $P=0.05$. This means the traditional impact or citations of these articles have been decreased during these years.

Table 2. Spearman correlation coefficient test between traditional impact and publication date

Statistical features Test	coefficient	critical value	Degrees of freedom	Level of Sig.
Spearman correlation	-0.188*	0.165	185	0.10

* $P<0.05$

H3. Is there any correlation between the modern impact and Publication date in BioChem. & M.Bio. retracted articles in WoS?

As for Table 3, the coefficient between these two variables was ($R=-0.188$) which was significantly positively higher than critical value ($r=0.176$) by 185 degrees of freedom with $P=0.05$. This means the modern impact or mentions of these articles have been increased during these years.

Table 3. Spearman correlation coefficient test between modern impact and publication date of articles

Statistical features Test	coefficient	critical value	Degrees of freedom	Level of Sig.
Spearman correlation	0.176*	0.165	185	0.000

* $P<0.05$

Discussion

Publication date of retracted article

These papers had published from 1997 to 2016 and the retraction rate have been increased between 2007 and 2008 and 2014. This means the retraction has been risen within these years heterogeneously like findings in Tjink, Verbeke & Smulders (2014), Couzin-Frankel (2013); Fanelli (2013); Noyori & Richmond (2013); and Sugawara et al. (2017).

Citation status in retracted articles

According to the findings 31 retracted articles got 67 citation- beside getting 0.36 citation per articles - is disappointing as these are not valuable research to refer to, and there were previous studies about increasing (Pfeifer & Snodgrass, 1990; Budd, Sievert & Schultz, 1998) and decreasing (Furman, Jensen & Murray, 2012) the citation rate of papers after retraction. This can be the subject for future studies to see what these citations are really about. It is worth to

say that studying retracted publications to understand them better may reduce error in science (Fang, Steen & Casadevall, 2012).

Altmetrics score of retracted papers

These articles have been mentioned 263 times mostly in twitter -like Sugawara et al. findings in 2017 or Faulkes in 2014-, blogs, Weibo and peer review sites. Having the altmetric score of 792 for 86 articles out of 185 makes the average of 4.28 per article which means there were 99 articles with no mentions while there were 86 that have been considered in the virtual scholarly world. It is against the results in Costas, Zahedi, & Wouters in 2015 as they found the same density in altmetrics and citation rate in their sample while similar to their findings that the altmetric density is still low.

Using twitter and blogs for the most can reveal the advantages of carrying out a scientific dialog over modern channels like social media. The finding is in line with previous articles indicating that that researchers have twitted about their own studies so this may increase the modern impact of such a researches (Faulkes, 2014).

Moreover, there were no mention in Mendeley which was against Hammarfelt's results in 2014. He reckoned that Mendeley is a great altmetric source for journal articles in contrast to Twitter books assessment.

The correlation between the traditional impact and modern impact of retracted articles

There were no significant correlation between the traditional and modern impact of these articles which means their impact in formal and informal channels of data distribution have not followed any pattern. This result is against the finding of Costas, Zahedi, & Wouters in 2015 as they claimed a positive but weak correlation between altmetrics and citations and reckon that "altmetrics do not reflect the same concept of impact as citations".

The correlation between the traditional impact and Publication date of retracted articles

According to table 2 the citations of these articles have been decreased during these years which means the oldest articles cited more. Upon the literature, It was found that there were still citation to some of retracted like a reliable works (Pfeifer & Snodgrass, 1990; Budd, Sievert & Schultz, 1998) which is against the findings in this study; however, there were no significant pattern in Fang, Steen & Casadevall (2012).

The correlation between the modern impact and Publication date of retracted articles

Table 3 demonstrated that the article mentions have been increased during these years. This means the newest articles cited more and there have been noticed even more that the oldest one which is exactly the same as Costas, Zahedi, & Wouters (2015).

Conclusion

Hope this study draw consideration to better finding metrics for research quality as well as attract attentions to use different channels for researches and findings demonstrations. There are many metrics for research evaluations (Neylon & Wu, 2009) and a big variety to choose from in traditional or modern way.

According to the findings, Researches have to notice three main issues in their works:

1. To be aware of research misconduct which can degrading their attempt;
2. To cite to the most valuable studies that are "responsible contributor to the global problems facing mankind" (Noyori & Richmond, 2013);
3. To use modern scholarly environment to discuss the research as Faulkes (2014) called social media the "biggest research conference in the world". They made a new pathway to resonate articles informations and findings which may help in correcting idea, method or any unaware scientific mistakes.

Moreover, the altmetrics scores could strength (Haustein et al.,2014) some researches especially in humanities and social sciences which are not cited well in traditional way comparing to other fields (Costas, Zahedi, & Wouters, 2015; Hammarfelt,2014)

Acknowledgments

Thanks to WLIC 2017 for considering this study for oral presentation and also this is to appreciate Mr. Keyvanzadeh for his statistical tips during the research.

References

- Budd, J. M., Sievert, M., & Schultz, T. R. (1998). Phenomena of retraction: reasons for retraction and citations to the publications. *JAMA*, 280(3), 296-297.
- Buttlere, B., & Buder, J. (2017). Personalizing papers using Altmetrics: comparing paper 'Quality' or 'Impact' to person 'Intelligence' or 'Personality'. *Scientometrics*, 111(1), 219-239.
- Couzin-Frankel, J. (2013). Shaking up science. *Science*, 339, 386-389.
- Costas, R., Zahedi, Z., & Wouters, P. (2015). Do "altmetrics" correlate with citations? Extensive comparison of altmetric indicators with citations from a multidisciplinary perspective. *Journal of the Association for Information Science and Technology*, 66(10), 2003-2019.
- Enago Academy. (2016). *10 Types of Scientific Misconduct*. Retrieve time on 2017/01/17 from <https://www.enago.com/academy/10-types-of-scientific-misconduct/>
- Fanelli, D. (2013). Redefine misconduct as distorted reporting. *Nature*, 494, 149.
- Fang, F. C., Steen, R. G., & Casadevall, A. (2012). Misconduct accounts for the majority of retracted scientific publications. *Proceedings of the National Academy of Sciences*, 109(42), 17028-17033.
- Faulkes, Z (2014). The vacuum shouts back: postpublication peer review on social media. *Neuron*, 82(2), 258-260.
- Furman, J. L., Jensen, K., & Murray, F. (2012). Governing knowledge in the scientific community: Exploring the role of retractions in biomedicine. *Research Policy*, 41(2), 276-290.
- Gross, C. (2016). *Scientific misconduct. Annual review of psychology*, 67, 693-711.
- Hammarfelt, B. (2014). Using altmetrics for assessing research impact in the humanities. *Scientometrics*, 101(2), 1419-1430.
- Haustein, S., Peters, I., Bar-Ilan, J., Priem, J., Shema, H., & Terliesner, J. (2014). Coverage and adoption of altmetrics sources in the bibliometric community. *Scientometrics*, 101(2), 1145-1163.
- Lin, J., & Fenner, M. (2013). Altmetrics in evolution: Defining and redefining the ontology of article-level metrics. *Information Standards Quarterly*, 25(2), 20-26.
- Neylon, C., & Wu, S. (2009). Article-level metrics and the evolution of scientific impact. *PLoS Biol*, 7(11), e1000242.

Noyori, R., & Richmond, J. P. (2013). Ethical conduct in chemical research and publishing. *Advanced Synthesis & Catalysis*, 355(1), 3-9

Piwowar, H. (2013). Altmetrics: Value all research products. *Nature*, 493(7431), 159-159.

Pfeifer, M. P., & Snodgrass, G. L. (1990). The continued use of retracted, invalid scientific literature. *JAMA*, 263(10), 1420-1423.

Sugawara, Y., Tanimoto, T., Miyagawa, S., Murakami, M., Tsuya, A., Tanaka, A., & Narimatsu, H. (2017). Scientific misconduct and social media: role of twitter in the stimulus triggered acquisition of pluripotency cells scandal. *Journal of medical Internet research*, 19(2).

Thelwall, M., Haustein, S., Larivière, V., & Sugimoto, C. R. (2013). Do altmetrics work? Twitter and ten other social web services. *PloS one*, 8(5), e64841.

Tijndink, J. K., Verbeke, R., & Smulders, Y. M. (2014). Publication pressure and scientific misconduct in medical scientists. *Journal of Empirical Research on Human Research Ethics*, 9(5), 64-71.

Trueger, N. S., Thoma, B., Hsu, C. H., Sullivan, D., Peters, L., & Lin, M. (2015). The Altmetric Score: a new measure for article-level dissemination and impact. *Annals of emergency medicine*.

Van Raan, A. (1997). Scientometrics: State-of-the-art. *Scientometrics*, 38(1), 205-218.

Wager, Elizabeth, Barbour, Virginia, Steven Yentis and Kleinert, S. (2009). COPE's retraction guidelines. *The Lancet*, 374(9705), 1876-1877.

Ziliak, S. T. (2016). Statistical significance and scientific misconduct: improving the style of the published research paper. *Review of Social economy*, 74(1), 83-97.