

CORRELATION BETWEEN ALTMETRIC INDICATORS AND CITATION ON IN VITRO FERTILIZATION (IVF) PUBLISHED IN PLOS JOURNAL DURING 2011 TO 2017

Sandip Das

In the present digital era, researchers choose the articles on the basis of altmetric score. Though Citation is the true method for measuring the impact of any article but it takes too much time. In this paper the main focus is to calculate the correlation between altmetric indicators and citations for the articles on “In vitro fertilization” (IVF) published in PLOS journal during the period from 2011 to 2017.

Keywords: Altmetrics, Altmetrics Attention Score, PLOS journal, IVF, In Vitro Fertilization.

INTRODUCTION

In good old days scholars used to discuss their works with other scholars face to face but the situation and platform has drastically changed in the present era. Maximum number of scholars use web to do their regular research work, while publishers also want to publish articles on web for maximum visibility and accessibility. Generally, research scholars filter their required articles by the citation counting but getting citation to an article requires too much time. Though citation is the true measure for computing the impact but now a days altmetrics plays a vital role for impact measurement. After publishing an article, the scholar wants to know “what others says about his research?” Altmetrics does this job well in a much faster way. Citation is tracking formal acknowledged influence whereas altmetrics is tracking unintentional and informal influence [1].

Altmetric.com developed an online tool called bookmarklet which can track the online activities and impact of an article. Bookmarklet generates a score with a set of algorithm, known as Altmetric Attention Score (AAS) [2]. It track the online activities from the following:

- Public policy documents
- Wikipedia
- Mainstream media
- Blogs: Manually curated list of 9000 academics as well as non-academic blogs
- Online Reference Managers: E.g. Mendeley
- Social Media: E.g. Facebook, Google+, LinkedIn, Pinterest, Twitter
- Multimedia and other online Platforms: E.g. YouTube, Reddit, Q&A
- Post – publication peer review platform: E.g. Pub peer
- Research Highlights: E.g. F1000

Many altmetrics researches explain about the relation between citation and altmetrics score. Some studies found a strong relationship between the two, while

Sandip Das
J. D. Birla Institute,
Kolkata, W.B.
writetosandipdas@gmail.com

some others show their weak relationship. There is a lack of authentic evidence that altmetrics are effective measures of article impact [3]. The relationship among citation count and altmetrics score may differ from domain to domain. The main reason to develop altmetrics score for measuring impact of an article is to fill gap between impact and the date of publication.



Fig 1: A screenshot view of Altmetrics Attention Score by Bookmarklet

OBJECTIVE OF THE STUDY

The major objective of this article is to correlate between altmetrics score and citation count. Whether or not, altmetrics can be used as an impact measuring tool to find out relevant research article.

REVIEW OF THE RELATED LITERATURE

Costaas, Zahedi & Wouters [4] in their research concluded that 'the social activities among the research scholars are increasing day by day and that where their research could play a vital role' but the presence and density of altmetrics is still low in terms of measuring scientific research. More studies in depth should replace the traditional metrics to measure the research impact.

Zohreh Zahedi, Rodrigo Costas & Paul Wouters [5] analyzed 20,000 random publications from web of science and tried to know the Impact story and correlate altmetrics and citation. They noticed that almetrics source mendeley is the highest source data and a strong

correlation has been found between mendeley and citation.

M. Thelwall, S. Haustein, V. Larivie`re & C.R. Sugimoto [5] recommended that among the eleven altmetrics sources, six have got the strong association with citation counts in medical and biological science articles.

Eysenbach G. [7] studied that tweets can be a measure for predicting highly cited article. It could increase the citation and also measure the quality of an article.

C. Syamili & R.V. Rekha [8] focused on Ebola disease article published on PLOS ONE journal during 2010-2015. They observed the correlation between altmetrics and citation count, the result of which shows strong positive relationship between them.

METHODOLOGY

To grasp the correlation between altmetrics score and citation count data collected from PLOS ONE journal on "In vitro fertilization" (IVF) articles during 2011 to 2017. PLOS ONE is a peer-reviewed open access journal published by Public Library of Science (PLOS). It was assigned 2.806 impact factor during 2016. In Vitro Fertilisation (IVF) is a process whereby an egg is combined with sperm outside the body, in vitro ("in glass"). Robert Edwards was awarded the Nobel Prize 2010 in Physiology or Medicine "for the development of in vitro fertilization". During this time, a total of 29 research articles were published on IVF. The altmetric scores on different area and citation data taken manually from PLOS ONE journal, correlation was applied on citation and the different area of altmetrics. PLOS ONE journal visualizes almetrics indicators as like View, Save, and Discussion. The collected data is narrated in Table 1.

The formula for calculating correlation is given:

$$\text{Correlation}(r) = \frac{N\sum pq - (\sum p)(\sum q)}{\sqrt{[N\sum p^2 - (\sum p)^2][N\sum q^2 - (\sum q)^2]}}$$

Table 1: Distribution of Altmetric and Citation Scores During the Period 2011-2017

S. No.	Title	Year	Views	Save	Discussion	Citation
1	Association of FMR1 Genotypes with In Vitro Fertilization (IVF) Outcomes Based on Ethnicity/Race	2011	4200	22	0	44
2	Hormone-Dependent Bacterial Growth, Persistence and Biofilm Formation – A Pilot Study Investigating Human Follicular Fluid Collected during IVF Cycles	2012	4316	17	0	11
3	Microorganisms within Human Follicular Fluid: Effects on IVF	2013	7455	32	2	13
4	Sperm Recovery and IVF after Testicular Sperm Extraction (TESE): Effect of Male Diagnosis and Use of Off-Site Surgical Centers on Sperm Recovery and IVF	2013	12125	19	3	5
5	Stress and Anxiety Scores in First and Repeat IVF Cycles: A Pilot Study	2013	5763	43	1	23
6	Factors Associated with Failed Treatment: an Analysis of 121,744 Women Embarking on Their First IVF Cycles	2013	5683	35	2	22
7	An Integrated Approach Based on Multiplexed Protein Array and iTRAQ Labeling for In-Depth Identification of Pathways Associated to IVF Outcome	2013	2547	17	0	6
8	Impaired Glucose Metabolism in Response to High Fat Diet in Female Mice Conceived by In Vitro Fertilization (IVF) or Ovarian Stimulation Alone	2014	2553	16	0	7
9	Biopsy of Human Morula-Stage Embryos: Outcome of 215 IVF/ICSI Cycles with PGS	2014	6757	20	0	0
10	Oocytes with a Dark Zona Pellucida Demonstrate Lower Fertilization, Implantation and Clinical Pregnancy Rates in IVF/ICSI Cycles	2014	6190	12	0	12
11	Associations between Individual and Combined Polymorphisms of the TNF and VEGF Genes and the Embryo Implantation Rate in Patients Undergoing In Vitro Fertilization	2014	2489	17	0	4
12	Comparisons of GnRH Antagonist versus GnRH Agonist Protocol in Supposed Normal Ovarian Responders Undergoing IVF: A Systematic Review and Meta-Analysis	2014	6298	31	0	26
13	Oocyte Scoring Enhances Embryo-Scoring in Predicting Pregnancy Chances with IVF Where It Counts Most	2015	4333	23	1	5
14	Can Comprehensive Chromosome Screening Technology Improve IVF/ICSI Outcomes? A Meta-Analysis	2015	4762	41	0	26

15	Is the GnRH Antagonist Protocol Effective at Preventing OHSS for Potentially High Responders Undergoing IVF/ICSI?	2015	1885	7	1	4
16	Short versus Long Gonadotropin-Releasing Hormone Analogue Suppression Protocols in IVF/ICSI Cycles in Patients of Various Age Ranges	2015	2727	2	0	2
17	Correction: Live Birth and Cumulative Live Birth Rates in Expected Poor Ovarian Responders Defined by the Bologna Criteria Following IVF/ICSI Treatment	2015	741	0	0	0
18	Live Birth and Cumulative Live Birth Rates in Expected Poor Ovarian Responders Defined by the Bologna Criteria Following IVF/ICSI Treatment	2015	2693	14	0	8
19	Serum Dehydroepiandrosterone Sulphate Concentration Is Not a Predictive Factor in IVF Outcomes before the First Cycle of GnRH Agonist Administration in Women with Normal Ovarian Reserve	2015	1395	18	0	0
20	Reassessing the feasibility of the zygote score for predicting embryo viability in IVF/ICSI using the GnRH antagonist protocol compared to the long protocol	2016	1004	3	0	1
21	Influence of TP53 Codon 72 Polymorphism Alone or in Combination with HDM2 SNP309 on Human Infertility and IVF Outcome	2016	1004	3	0	1
22	Porcine Pluripotent Stem Cells Derived from IVF Embryos Contribute to Chimeric Development In Vivo	2016	2832	10	2	3
23	Subcutaneous Progesterone Is Effective and Safe for Luteal Phase Support in IVF: An Individual Patient Data Meta-Analysis of the Phase III Trials	2016	4655	18	0	0
24	Elevated Progesterone Levels on the Day of Oocyte Maturation May Affect Top Quality Embryo IVF Cycles	2016	9706	24	0	7
25	Effect of Female Body Mass Index on Oocyte Quantity in Fertility Treatments (IVF): Treatment Cycle Number Is a Possible Effect Modifier. A Register-Based Cohort Study	2016	2400	11	1	0
26	Weigh the pros and cons to ovarian reserve before stripping ovarian endometriomas prior to IVF/ICSI: A meta-analysis	2017	1337	5	0	1
27	Top quality blastocyst formation rates in relation to progesterone levels on the day of oocyte maturation in GnRH antagonist IVF/ICSI cycles	2017	2015	4	0	0

28	Reassessing the feasibility of the zygote score for predicting embryo viability in IVF/ICSI using the GnRH antagonist protocol compared to the long protocol	2017	1774	4	0	0
29	Sliding scale HCG trigger yields equivalent pregnancy outcomes and reduces ovarian hyperstimulation syndrome: Analysis of 10,427 IVF-ICSI cycles	2017	1732	6	0	0

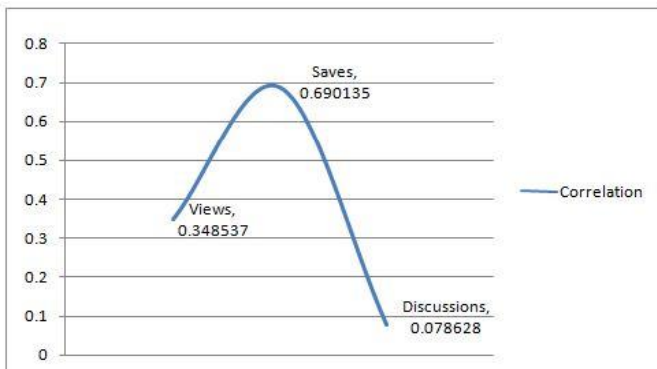
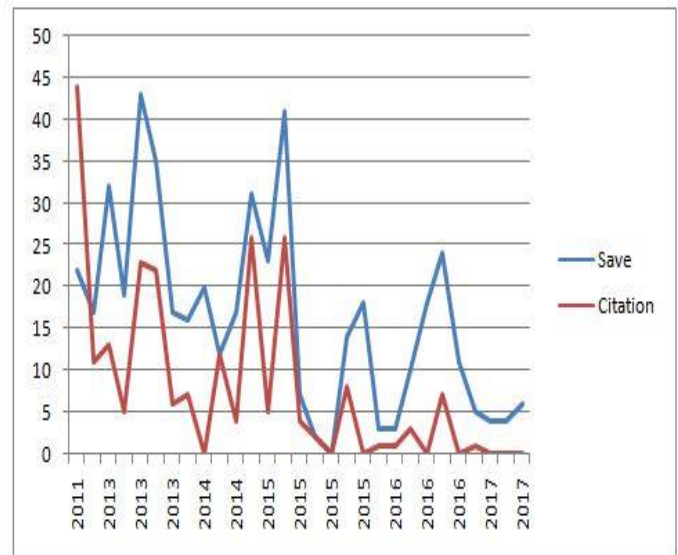
Table 2: Correlation among Different Altmetrics Scores and Citation

	Views	Saves	Discussions	Citations
Views	1			
Saves	0.607739	1		
Discussions	0.502555	0.304174	1	
Citations	0.348537	0.690135	0.078628	1

DATA ANALYSIS AND INTERPRETATION

Relationship between Altmetrics Indicators and Citation

The correlation coefficient r indicates the strong relationship between almetrics indicators and citation. After calculating the correlation, the r for saves and citation is $r = 0.69$. It clearly indicates that it has the strong and positive correlation. The graph given in Fig. 2 clearly shows the strong correlation between citations and saves.


Fig 2: Correlation of Altmetrics Indicators with Citation

Fig 3: Relation between Saves and Citations

Relationship between Views and Citation

The correlation coefficient r between views and citations is $r = 0.34853757$. It does not show any strong relationship between them. Fig.4 clearly demonstrates that views of any article is more than its citations.

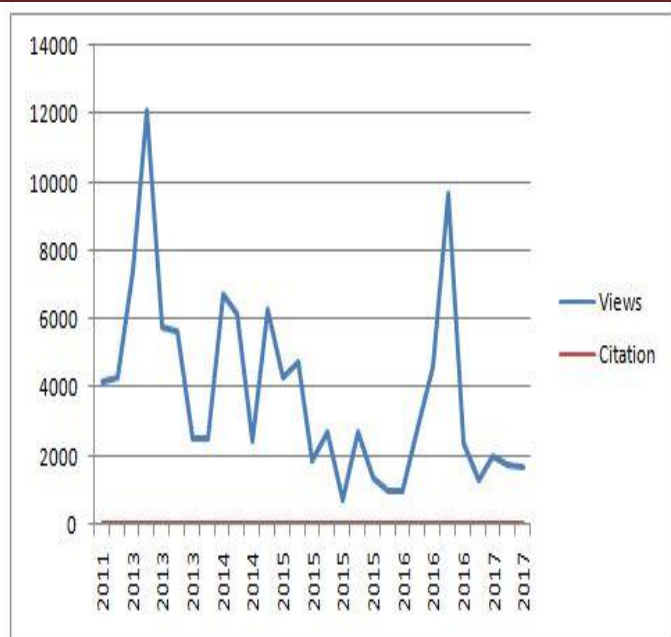


Fig 4: Relationship between Views and Citations

Relationship between Discussions and Citations

The correlation coefficient r between discussion and citations is $r = 0.07862880$. This is the lowest bonding relationship.

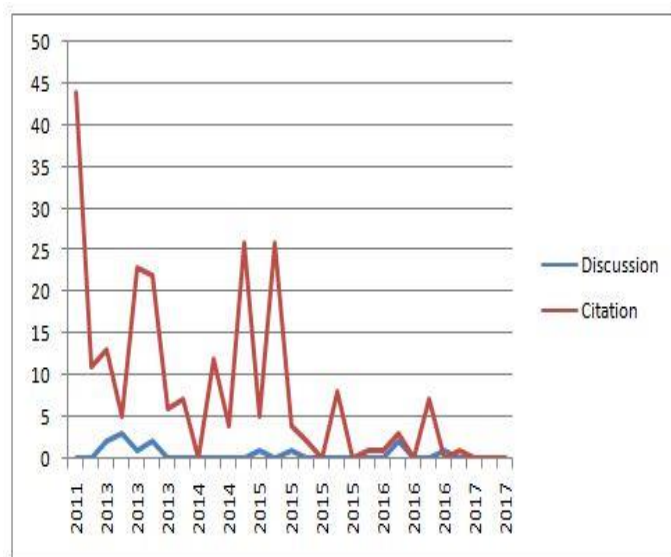


Fig 5: Relationship between Discussion and Citation

CONCLUSION

The article tries to analyze the correlation between almetrics indicators and traditional citation of the articles which has been published in PLOS ONE journal on the topic of "In vitro fertilization" (IVF) during

2011 to 2017. The results strongly show that the relationship between altmetric indicators, Saves and Citation, is more positive than others. In this situation we can say that those who save the article for further study they might cite those articles. Researcher can refer any newly published article on the basis of altmetric indicators, because it takes far little time than citation.

REFERENCES

- [1] Priem, J., Piwowar, H.A., & Hemminger, B.M. (2012). Altmetrics in the wild: Using social media to explore scholarly impact. <https://arxiv.org/html/1203.4745> [accessed 31 January 2018].
- [2] Altmetric Attention Score. <https://www.altmetric.com/about-our-data/our-sources/> [accessed 31 January 2018].
- [3] Bornmann, L. (2014). Do altmetrics point to the broader impact of research? An overview of benefits and disadvantages of altmetrics. *Journal of Informetrics*, 8, 895-903.
- [4] Costas, R., Zahedi, Z. and Wouters, P. Do "ltmetrics" correlate with citations? Extensive comparison of altmetric indicators with citations from a multidisciplinary perspective. *Journal of the Association for Information Science and Technology*, 66, 2015, 2003–2019. DOI: 10.1002/asi.23309.
- [5] Zahedi, Z., Costas, R. & Wouters, P. How well developed are altmetrics? A cross-disciplinary analysis of the presence of 'alternative metrics' in scientific publications. *Scientometrics*, 101, 2014, 1491. DOI: org/10.1007/s11192-014-1264-0.
- [6] Thelwall M, Haustein S, Larivie`re V, Sugimoto CR. Do Altmetrics Work? Twitter and Ten Other Social Web Services. *PLoS ONE*, 8(5), 2013, e64841. DOI: 10.1371/journal.pone.0064841
- [7] Eysenbach G. Can Tweets Predict Citations? Metrics of Social Impact Based on Twitter and Correlation with Traditional Metrics of Scientific Impact. *Journal of Medical Internet Research*, 13(4), 2011, e123. <http://www.jmir.org/2011/4/e123>.

- [8] C. Syamili & R.V. Rekha. Do altmetric correlate with citation?. A study based on PLOS ONE journal. *COLLNET Journal of Scientometrics and Information Management*, 11(1), 2017, 103-117.
DOI: 10.1080/09737766.2016.1260815.