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## Phytochemistry Literature: An Altmetrics Analysis

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### Abstract

*This article analyses the articles on Phytochemistry Literature with the tools of Altmetric. For this study, 10 articles on phytochemistry literature were taken for the analysis. This study also compares the Citations received by a publication against the Altmetric score. The study shows that the most of the Publications are shared by the social media Twitter. Moreover readers prefer to read the articles through Reference Manager Mendeley. The study discovers that there is a moderate correlation between Citation and Altmetric Score. Only one paper obtains citation and Altmetric score equally. Another paper gets citation and Altmetric score in near equal. Out of the 10 papers, four papers received more citations. Of the 4 highly cited articles, three papers receive very low Altmetric score and only one paper receives high Altmetric score.*

**Keywords:** Altmetrics, Phytochemistry, Twitter, Facebook, Mendeley, Citation, Blog and Altmetric Score.

### Introduction

Altmetrics is a newly emerging research area to evaluate the scholarly impact of an article where social media is applied as a source of metrics. Altmetrics are metrics which is used to measure the impact of an article on web platforms. Altmetrics are also called as article level metrics. The term altmetrics is the abbreviated form of alternative metrics which is alternate to the traditional Citation based metrics study such as Bibliometrics, Scientometrics and Webometrics. Education and Research has increasingly moved online and altmetrics help the researchers to collect data about online interactions and discussions of an article in web based platforms such as news, blogs, Twitter, Facebook and podcasts, It can also be used to collect data about the number of sharing in social bookmarking services and reference managers such as Mendeley and Citeulike.

### Review of Literature

**Alperin, J. P. (2015)<sup>1</sup>** conducted an altmetric study by using article metadata from SciELO, a Latin American Journal portal. The study focused on year wise, country wise, subject wise and language wise coverage levels. Coverage levels were zero for most of the social media. Only three web sources namely Twitter, Facebook and

Mendeley had coverage levels above 2%. **Ann E. Williams, (2017)<sup>2</sup>** provided an overview and evaluation of altmetrics for scholars, academics and researchers to consider when adopting, utilizing, and researching these tools. **Baskaran, C. (2013)<sup>3</sup>** carried out a scientometrics study to find the research productivity of Alagappa University in terms of author productivity, subject-wise and institution-wise collaboration and ranking of authors. Relative growth rate (RGR) was found to be fluctuating trend during the study period. Degree of collaboration and its' mean value is found to be 0.963. The top three institutions with Alagappa University are Central Electro Chemical Research Institute, National Cheng King University, and Anna University. **Baskaran, C. (2018)<sup>4</sup>** evaluated the research publications of the LIS researchers in DESIDOC Journal of Library and Information technology during 2011-2017. It is found that highest RGR was 0.18 in 2012 and lowest RGR was 0.04 equally shared by 2014 and 2016. Single author contributed 36.75% of papers whereas 63.25% of the papers contributed by collaborative authors. Among prolific authors, BM. Guptha occupied the number 1 position. **Baskaran, C and Rameshbabu, P. (2019)<sup>5</sup>** conducted a scientometric analysis in the publication of Forensic Medicine output during 1989-2016.. The findings revealed that the growth rate of Publications at lowest level was 11 (0.26%) in 1989 and highest level was 447 (10.76%) in 2013. The exponential growth for authors in the field of Forensic Medicine is  $n = 4.4320914$ . **Batcha M, Sadik.(2018)<sup>6</sup>** conducted a Altmetric analysis to find whether the Citation make impact on social media. The study analysed top 15 highly cited articles of University of Madras. Findings revealed that there was a high correlation between the rank of Citation and Altmetric score. **Cameron Barnes (2015)<sup>7</sup>** provided an introduction to the use of Altmetrics tool to evaluate research impact. The study showed that altmetrics are an extremely inadequate tool for predicting article performance in terms of future Citations. On the other hand, Altmetrics are better at measuring the public consumption of knowledge. **Eysenbach, G. (2011)<sup>8</sup>** analyzed articles in Journal of Medical Internet Research with the tool of Altmetric to find whether Altmetric score is specific enough to predict the highly cited articles. Findings revealed that within the first 3 days of article publications, Twitter is able predict the highly cited articles. **Hammarfelt, Björn. (2014)<sup>9</sup>** analysed journal articles (310) and books (54) that are related to the field of humanities published by Swedish universities with the tools of altmetric. Findings revealed that Mendeley has the highest coverage of journal articles (61%) followed by Twitter (21%) whereas very few are mentioned in blogs or on Facebook.. **Ortega, J. L. (2015)<sup>10</sup>** examined the relationship between altmetrics and bibliometric indicators at the author level. The study analysed nearly 10,000 author profiles from Spanish National Research Council which were extracted from the social sites such as ResearchGate, Academia.edu, Mendeley, Microsoft Academic Search and Google Scholar Citations. Correlations point out that there is slight relationship between altmetric and bibliometric indicators at author level. **Saravanan,S and Baskaran,C. (2018)<sup>11</sup>** evaluated the publications of Indian scientists in the field of Bioremediation Research with the tool of scientometrics. The number of publications indexed in web of science taken for the analysis is 1981. Indian Institute of technology, Baba atomic research centre and CSIR are the major producers of research output in the area of bioremediation. **Shrivastava, R., & Mahajan, P. (2015)<sup>12</sup>** conducted a study which aims to investigate the relationship between the altmetric indicators from ResearchGate and the bibliometric indicators from the Scopus database. Moreover the study examined the

relationship amongst the Research Gate altmetric indicators themselves. The study proved that most of the Research Gate metrics showed strong positive correlation with the Scopus metrics. **Shrivastava, R., & Mahajan, P. (2017)**<sup>13</sup> conducted an altmetric analysis of faculty members and research scholars of Department of Physics and Astrophysics from University of Delhi (India) who are members of the academic networking site ResearchGate. The findings discovered that the publications added by researchers to their profiles were relatively low. Majority of the researchers had impact points in the range of 0.2-50. **Thelwall, M., Kousha, K., Dinsmore, A., & Dolby, K. (2016)**<sup>14</sup> conducted a study to find whether altmetric and webometric indicators are helpful for the funding agencies' evaluating their funding schemes. Findings revealed that only some of the Altmetric indicators are helpful for the funding agencies' evaluating their funding schemes than webometric indicators.

### **Altmetric Score calculation**

With reference to altmetric.com (Altmetric Attention Score, n.d.)<sup>15</sup> the score in the Table 1 is discussed. Since it is a new emerging discipline, there is no other open source for the altmetric score calculation except altmetric.com. The score allotted for article in News based on the reach and popularity of the news outlet. For instance, a article mentioned in a popular news outlet like The New York Times will contribute more altmetric score than a news mentioned in a less popular publication such as 2Minute Medicine. In Wikipedia, altmetrics score is a static one. If a research output is mentioned in one Wikipedia post, the allotted score for that paper will be 3. However, if a research output is mentioned in more than one Wikipedia post, the score will remain 3. If a research output is stated in a policy document, then the score for the article is 3. But if it is mentioned in two different policy documents, then the score of the article will be increased by 6. Open Syllabus score is static. If a research output is mentioned in one syllabi, the score for that paper will be 1. The score will not increase, if the output is mentioned in more than one open syllabus. Research output in a patent has a default score contribution of 3. If the output is mentioned in another patent from a different jurisdiction the score will be 6. But if the output is mentioned in more than one patent from the same jurisdiction, then the score will remain 3. If a Research output is mentioned in re-tweets and re-posts count for 0.85, rather than 1, as they are secondhand attention. The total score will always be rounded up to the nearest whole number.

**Table 1: Altmetrics score for each web source**

S. No	Web Source	Score
1	News	8
2	Blogs	5
3	Twitter	1
4	Facebook	0.25
5	Sina Weibo	1
6	Wikipedia	3
7	Policy Documents (per source)	3
8	Q&A	0.25
9	F1000/Publons/Pubpeer	1
10	YouTube	0.25
11	Reddit/Pinterest	0.25
12	LinkedIn	0.5
13	Open Syllabus	1
14	Google+	1
15	Patents	3

### Altmetrics Tools

**Almetric.com** (Altmetric Attention Score, n.d.)<sup>15</sup> gives altmetric score for articles from different publishers, databases and institutional repositories. **CitedIn** (CitedIn API, n.d.)<sup>16</sup> tracks online Citations in database, wikipedia, blogs and community sites to the articles covered in Pubmed. The CitedIn number for online impact is called CI-number. CI-number is allotted to Scientific literature contained in Pubmed. **Crowdometer** (CrowdoMeter, n.d.)<sup>17</sup> is a altmetrics web tool which shows tweets linking to articles and permits users to add semantic information. **ImpactStory** (Impactstory, n.d.)<sup>18</sup> is a web application to track the impact score of a wide range of research relic such as articles, datasets, research code, slides and so on. **PaperCritic** (PaperCritic, 2019)<sup>19</sup> offers researchers all types of feedback received about their scientific work as well as permits everyone to review the works of others. **Plum Analytics** (Plum Analytics, 2019)<sup>20</sup> is a product of EBSCO. They collect impact score in 5 major categories: Usage, Captures, mentions, Social media and Citations. **PLoS Impact Explorer** (Altmetric, n.d.)<sup>21</sup> displays the conversations collected by altmetric.com for articles published by Public Library of Science. **Readermeter** (Readermeter, n.d.)<sup>22</sup> provides mixture of article level

and author level metrics based on the consumption by a large population of readers. **ScienceCard** (ScienceCard API, n.d.)<sup>23</sup> collects altmetrics information of a particular researcher

## **Analysis and Interpretations**

### **Correlational analysis of Citation and Altmetric Score**

Table 1 shows the altmetric and Citation analysis of 10 articles in phytochemistry literature. Paper 10 has the highest altmetric score, whereas the lowest altmetric score of 1 is shared by 6 papers. The second highest altmetric score is received by paper 3. On the other hand the maximum Citations are received by the paper number 3, whereas only one Citation is received by paper number 9. Paper 7 is in the second position. It received 23 Citation. Paper number 2 does not receive any Citation. Most of the papers received its impact score through sharing it in twitter, whereas paper 7 and 10 got the score through sharing in it Google+ and blogs. In this study, Paper 10 has the highest altmetric score. This is due to the paper is shared in blog. Blog gives more altmetric score than the twitter. Out of the 10 article, 4 articles have high Citation score. Of the 4 highly cited articles, only one article has more Altmetric score. On the other hand, only one article receives Citation and Altmetric score equally. Another article receives Citation and Altmetric score in near equal.

<b>Paper</b>	<b>Authors</b>	<b>Title</b>	<b>Year of Publication</b>	<b>Citation</b>	<b>Altmetrics Score</b>
1	Yang Li et al.	A Review on Phytochemistry and Pharmacology of Cortex Periplocae	2016	4	2
2	Madamanchi Geethangili and Shih-Torng Ding	A Review of the Phytochemistry and Pharmacology of Phyllanthus urinaria L.	2018	0	1
3	Shukranul Mawa et al.	Ficus carica L. (Moraceae): Phytochemistry, Traditional Uses and Biological Activities	2013	37	5
4	Liza M. Holeski et al.	Patterns of Phytochemical Variation in Mimulus guttatus (Yellow Monkeyflower)	2013	17	1
5	Diana Jæger et al.	Phytochemistry and bioactivity of Acacia sensu stricto (Fabaceae: Mimosoideae)	2018	0	1
6	Zheng Ma and Hongxia Zhang	Phytochemical Constituents, Health Benefits, and Industrial Applications of Grape Seeds: A Mini-Review	2017	14	1
7	Jamuna Senguttuvan et al.	Phytochemical analysis and evaluation of leaf and root parts of the medicinal herb, Hypochaeris radicata L. for in vitro antioxidant activities	2014	23	1
8	Rafaela da Trindade et al.	Copaifera of the Neotropics: A Review of the Phytochemistry and Pharmacology	2018	5	1
9	Enas Mohamed Eliase	Phytochemical Constituents and Biological Activities of Melicope lunu-ankenda	2018	1	2
10	Analucia G. Terças et al.	Phytochemical Characterization of Terminalia catappa Linn. Extracts and Their antifungal Activities against Candida spp	2017	6	6

**Table 2: List of Publications with Citation and Altmetric Score**

### Analysis of Articles Shared Through Different Social Media

Score and No. of Impacts	Paper										Total
	1	2	3	4	5	6	7	8	9	10	
Citations	4	0	37	17	0	14	23	5	1	6	107
Altmetric Score	2	1	5	1	1	1	1	1	2	6	21
Tweeters	2	2	4	1	1	1	0	1	2	0	14
Mendeley	6	2	145	26	2	25	178	21	2	17	424
Blogs	0	0	0	0	0	0	0	0	0	1	1
Citeulike	0	0	0	0	0	0	0	0	0	0	0
News Outlet	0	0	0	0	0	0	0	0	0	0	0
Facebook	0	0	4	0	0	0	0	0	0	0	4
Google +	0	0	0	0	0	0	1	0	0	0	1
Policy Source	0	0	0	0	0	0	0	0	0	0	0
Wikipedia	0	0	0	0	0	0	0	0	0	0	0
Res. Highlight Platform	0	0	0	0	0	0	0	0	0	0	0
Weibo user	0	0	0	0	0	0	0	0	0	0	0
Redditors	0	0	0	0	0	0	0	0	0	0	0

**Table 3: Articles shared Through Different Social Media**



Table 3 shows the articles which are shared by different social media. Most of the articles are shared by twitter. Of the 10 articles, three articles which are shared by Google+ , Facebook and Blog respectively. Paper 7 is shared by Google+ alone and Paper 10 is shared by blog. But paper 3 is shared by both Twitter and Facebook. On the usage of reference manager Mendeley, almost all the papers are shared in Mendeley. Of the 10 papers, Paper 7 has the highest sharing (178) in Mendeley. The second highest sharing article is paper 3 (145). Three papers shared the lowest sharing (2) in Meneley.

#### Geographic Distribution of Publications through Twitter

Paper	Twtters Total	Country					Unknown
		Australia	Canada	Switzerland	UK	US	
1	2	0	0	0	0	0	2
2	2	0	0	1	0	0	1
3	4	0	0	0	1	2	1
4	1	0	0	0	0	1	0
5	1	1	0	0	0	0	0
6	1	0	0	1	0	0	0
7	0	0	0	0	0	0	0
8	1	0	1	0	0	0	0
9	2	0	0	0	0	0	2
10	0	0	0	0	0	0	0
<b>Total</b>	14	1	1	2	1	3	6

**Table 4. Geographic Distribution of articles through Twitter**

Table 4 shows the geographic distribution of articles in phytochemistry literature. Among the Geographical Distribution, United state has got the maximum share of article (2) through Twitter. At the same time the Unknown country has also got the same amount of sharing of article (2) through Twitter. On the other hand, Maximum number of Twitter sharing is received by paper number 3. The paper 3 is shared 4 times in Twitter by United Kingdom (1), United States (2) and Unknown country (1). Among the total Geographical Distribution, unknown country has got the maximum Twitter sharing (6). The second maximum Twitter sharing country is United States (3)

#### Conclusion

If an article is frequently discussed on web based platform, then it shows the importance of its impact and contribution to the research world.. Research articles only taken for this study. The study mainly focused the Phytochemistry field. But some of the article combines both phytochemistry and Pharmacology. The study proves the highly cited articles have their impact in social media also. Among the Total Geographical distribution of publications through Twitter, Unknown country is dominating and United

states placed in second rank. Another important thing in this study is that even though most of the papers are highly shared through reference manager Mendeley, It does not contribute any Altmetric score. In concerning with the analysis of articles shared through different social media, most of the articles are shared by twitter and Mendeley. Only three articles are shared by Google+, Facebook and Blog. This finding clearly shows that the readers prefer to share the articles through Twitter and most of the readers prefer to read the articles through Reference manager Mendeley only. Of the 10 papers, four papers received maximum Citations. Of the four highly cited papers, only one paper receives high Altmetric score. Among the total sharing, Mendeley is placed in first position (424), Twitter receives the second (14), Facebook obtains the third rank (4) and the last Rank is equally shared by blog (1) and Google+ (1)

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