Scholarly Publishing Patterns of Medical Academics : A case study of ResearchGate profile of King George's Medical University, Lucknow

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Abstract :

ResearchGate, an academic social networking site, emerged as an alternative platform among the researchers to connect and disseminate their research findings to the global research community and build chances of collaborations with researchers in overlapping areas. The present study examined the ResearchGate profiles of King George's Medical University, Lucknow in an altmetric perspective to evaluate the scholarly publishing patterns of medical academics. The data collected by manually visiting the ResearchGate profiles of the faculty members of various departments of KGMU. The study revealed that 32 departments of KGMU having profiles on ResearchGate contributed a total of 1196 publications. The 'BMJ Case Reports' comes out as the most preferred and productive journal with 124 articles and 10.37% share. Four hundred eighteen (34.9%) full-text articles are available on ResearchGate out of total uploaded articles. Team research involving four or more authors is a norm in KGMU.
Keywords: Altmetrics, Academic Social Networking, ResearchGate, Scholarly communication, Scholarly Publishing, KGMU.

Introduction

In today's modern era, social networking sites(SNSs) have become an easy, accessible and effective medium of communication. Using SNSs is not just limited to the public, but several SNSs have emerged that cater to the networking needs of scientists, academics and scholars. They see it as an alternative platform using which they can connect and disseminate their research and findings to the global research community and also build connections with researchers in overlapping areas. ResearchGate.net and Academia.edu are the academic social networking sites which are very popular among researchers, scholars and scientists community. With the advancement in information technology and communication, R&D is also gaining its pace day by day in every field of knowledge. The researchers and scholars are actively sharing and communicating their papers and articles not only in conventional publishing media but also uploading it on the academic SNSs such as ResearchGate and Academia.edu. The features such as tagging, bookmarking, sharing research, connecting with each another, collaborating on working papers are the prominent reasons for which authors are using such academic SNSs (Reher & Haustein, 2010). With the increasing inclinations of scholars towards the academic SNSs, the platform providers started making available various metrics such as readership, total number of citations, total number of tweets, total number of profile views, a total number of publication views, and other different analytics, commonly termed as "altmetrics" (Priem et al., 2010, 2012). "These metric parameters can be used for analysis and evaluation of the research productivity of an individual researcher, a research work, an institution or a country. The term altmetrics proposed in 2010, as speculation of article-level metrics. Altmetrics are metrics or measurement and subjective information integral to conventional, reference-based measurements" (Altmetric, 2020.). It can also be understood as an indicator of impact and influence. In simple terms, they are 'new metrics based on the social web for analysing and informing scholarship' (Priem et al., 2010).
Although altmetrics is based on regularly pondered articles, it can connect them to individuals, journals, books, informational indexes, introductions, recordings, source code archives, website

pages, and so forth (Altmetrics, 2020.). Altmetrics are used in academia, by individuals (as evidence of influence for promotion and tenure and in applying for grants), libraries (for making collections management decisions and understanding the use of IR and digital library content), institutions (for benchmarking a university's overall performance), and publishers (to benchmark their journals' performance in specific subject areas) alike.

The study aims to analyse the scholarly publishing pattern of a nationally acclaimed medical university in the capital of India's highly populated state, Uttar Pradesh analysing the data from ResearchGate, an academic SNS.

ResearchGate is an academic social networking site for scientists and scholars. These academic SNSs provide them with new tools to share, communicate, collaborate, connect and get updated with the feeds and information which matters the most. ResearchGate came into existence in 2008 by three people Ijad Madisch, Soren Hofmayer (both physician by profession) and Horst Fickenscher (a computer specialist) in Hannover & Boston. ResearchGate in just ten years attracted over 15 million researchers and scientists, headquartered in Berlin. It has 300+ employees, of which 68% are international (ResearchGate, 2020). ResearchGate network is growing with the pace of time serving 15+ million users from 193 countries and showcasing 100+ million publications. It is a network where one finds, shares and discovers scientific literature of his/her interest. Discipline-wise distribution of members of ResearchGate covers 15% Medicine, 14% Biology, 14% Engineering, 7% Chemistry, 6% Computer Science, 6% Physics and 40% others (About Us-ResearchGate, 2020.). It offers various services to their members such as sharing and dissemination of publications, full-text archiving, communication, connecting and collaborating with colleagues, peers and experts of the respective fields. It provides statistics such as views, citation counts, reads, downloads, followers, and following authors.

The present study aims to analyse the institutional ResearchGate profile of King George's Medical University, as it is the premier government non-profit medical university present in the Lucknow district of Uttar Pradesh established by an act passed by the Government of Uttar Pradesh on 16 September 2002. The official website claims that "it caters to the medical needs of states of UP and others like Bihar, Chhattisgarh, Madhya Pradesh and neighbouring Nepal and offer medical services to over 20 crore population. It is the largest residential medical university in India having Faculty of Medicine, Faculty of Dental Sciences, Faculty of Nursing and Faculty of Paramedical Sciences. The University runs various undergraduate, postgraduate, postgraduate diploma programs, super-speciality Courses and other paramedical courses. The National Assessment and Accreditation Council (NAAC) has given KGMU 'A' grade certification. The Ministry of Human Resource Development, Government of India has shortlisted KGMU among the probable list of 'Institute of Eminence'. The Gandhi Memorial & Associated Hospitals of KGMU has over 4500 functional beds with over 4500 patients admitted capacity, with on an average 10,000 new patients attending the OPD every day. Over 15 lac patients visit this Tertiary Care Centre, with 100,000 indoor admissions, in a year" (KGMU, 2019). Recently, the KGMU has become the only university from Lucknow to have found a place in top 100 universities in the country in the recently released union government's National Institutional Ranking Framework (NIRF). It had adjusted the university to the 15th best university in the country, a step higher than its ranking in 2016 when it was at the 16th rank, out of 100. In the separate category-wise ranking, KGMU has bagged the 5th spot in the top 25 medical universities in the country(Husain, 2018).

Related Studies

Majority of the studies on measuring the scholarly publishing patterns are based on conventional scholarly databases, such as Web of Science, Scopus or Google Scholar. Studies measuring research productivity applying altmetrics have been found on online reference manager service, Mendeley while a minuscule number of studies were found using academic SNSs, either ResearchGate or Academia.edu.

There have been several studies measuring institutional research productivity using secondary data from citation databases. Jeevan and Gupta (2002) and Singh, Gupta and Kumar (2005) investigated the research productivity of Indian Institute of Technology (IIT), Kharagpur and Roorkee, respectively using data from Science Citation Index. Similarly, Kumbar, Gupta and Dhawan (2008) had conducted a case study on the growth and impact of research output of the University of Mysore in science and technology using data from the Scopus database. Sevukan and Sharma (2008) had conducted a bibliometric study to analyse the research output of biotechnology faculties in Central Universities of India based on data collected from PubMed and Web of Science. Similarly, Bala and Gupta (2009) and later Kaur, Mahajan and Gupta (2011) analysed the research productivity of the Government Medical College & Hospital (GMCH), Chandigarh using the Scopus database. Jeyshankar, Babu and Rajendran (2011) had conducted a study to analyse the research articles published by the scientists of CSIR-Central Electrochemical Research Institute (CECRI) using data from indexing databases too. Wani, Hameed and Iqbal (2013) measured the research productivity of All India Institute of Medical Sciences (AIIMS) using Scopus online database. Pandita, Singh and Gaur (2014) conducted a comparative study to analyse the medical literature productivity and general publication trend of four most premier medical and research institutions of India; AIIMS(New Delhi), PGIMER(Chandigarh), SGPGIMS(Lucknow), JIPMER(Pondicherry) retrieving data from Web of Science, Thomson Reuters. Similarly, Nishavathi and Jeyshankar (2018) analysed the growth of research productivity of All India Institute of Medical Sciences (AIIMS), New Delhi using Scopus online database and reported most productive author, top journals, productive years and average h-index.

In literature, studies were also found that collect data from publications-lists and annual reports of the institutions to measure the scholarly publishing pattern of individual institutions. Nederhof, A. J., et al. (1993) studied the research performance of departments of Wageningen Agricultural University, the Netherlands collecting data from digitised publications-lists. Devi and Lekshmi (2014) performed the scientometric evaluation of publication productivity of Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI). They extracted the data for the study from the Annual report of the JNTBGRI from 2001 to 2010.

Some studies have also been conducted to investigate the awareness of researchers towards the availability of academic SNSs. Mahajan, Singh and Kumar (2013) surveyed the use of SNSs among the research scholars of Panjab University (PU) and Kurukshetra University (KU). They found that the research scholars were aware of SNSs and had profiles on the sites. They also found that most of the SNSs users (research scholars) are under the age group of 20-30 years. Singh and Kumar, 2013 surveyed the same user group and reported that only 34 % had reported usage of ResearchGate. They also reported that 70% of researchers use SNSs for finding information for their research-related work.

Shrivastava and Mahajan (2015) had carried out a study to find the relationship amongst the ResearchGate (RG) altmetric indicators and Scopus bibliometric indicators. The high affirmative

correlation of impact points with Scopus metric shows that RG impact points can also be seen as a new indicator. Shrivastava and Mahajan (2017) had carried out an altmetric analysis based on ResearchGate profiles of researchers in the department of physics and astrophysics, University of Delhi (India) and reported that researchers had not added enough publications to their profile and 28.32% members had not added even a single publication to their profile. They calculated correlation coefficients between RGScore and publications, reads, profile views, number of Full Texts and number of followers of a researcher and concluded that the number of publications has the highest correlation with RGScore. Strong correlations had also been reported in the study in between RGScore and reads, citations, networking, publications and other metrics respectively on the publications of the members of medical departments of the University of Delhi available on ResearchGate(Verma and Madhusudhan, 2018).

Singson and Amees (2017) had conducted a study to understand the motives, activities and benefits researchers seek or gain from joining ResearchGate. RG has enhanced the ability of scholars and researchers at Pondicherry University to stay abreast with the latest developments in their field of research(Singson and Amees, 2017). Ali and Richardson (2017) had conducted an altmetric study of profiles on ResearchGate of LIS scholars of Pakistan. They analysed gender and geographical location wise productivity of LIS scholars. They also found that ResearchGate plays a pivotal role to create collaboration and enhance the research performance of Pakistani LIS scholars(Ali and Richardson, 2017).

The above literature review shows the acceptance and recognition of RG among scholars, researchers and the scientific community. Further, the research productivity of major medical universities and institutions have been conducted in the recent past but the King George's Medical University(KGMU) having a history of over 100 years has not been studied. To fill and minimise this gap, the present study has been conducted, focusing on the scholarly publishing patterns of KGMU, further, analysing the top preferred journals, publication venues and accessibility of journals.

Objectives

The present study attempts to examine the ResearchGate profile of King George Medical University(KGMU) with the following specific objectives:
1. To identify the department-wise distribution of published research articles from the KGMU.
2. To study the year-wise distribution of research articles uploaded by KGMU faculty members.
3. To determine the availability of full-text of articles uploaded by KGMU faculty members on ResearchGate.
4. To identify the accessibility and characteristics of highly preferred journals by the faculty members of KGMU.
5. To find out the authorship pattern depicted in the publications of KGMU faculty members.

Methodology

For the study, KGMU is chosen as a representative case as it is the premier government non-profit medical university present in Lucknow, the capital of Uttar Pradesh state in India and is ranked in the top 100 universities in India as per the recently released union government's National

Institutional Ranking Framework (NIRF). Another reason was the availability of highly active footprints from the faculty members of KGMU on ResearchGate. The reason for choosing ResearchGate as a data source because none of the indexing databases has complete coverage of the total research output of the world, therefore it is difficult to verify the research productivity of an institute using conventional indexing databases only. Since ResearchGate provides the authors to upload their publications with no restrictions, it is assumed that the coverage will be more as authors also publish in articles not indexed by major indexing databases.

The data for the study has been collected and compiled manually by visiting the King George's Medical University profile, its departments and faculty profiles on the ResearchGate during the first week of February 2019. The bibliographic data of total 1196 articles available on ResearchGate profile of KGMU were collected. To collect data related to citations and other variables, Google scholar, Sherpa/RoMEO, journal webpages have been manually and individually visited. The citations for each article were retrieved from ResearchGate and Google Scholar by visiting document profiles on each platform, respectively. To identify the colour category of the publisher's archiving policy of all the journals publishing the research output of KGMU faculty members the journal profiles were visited on the Sherpa/RoMEO database. The data collected is then recorded and saved on Google Sheets for tabulation and analyses.

Results

Department-wise availability of articles on ResearchGate
The bibliographic data of 1196 publications were listed on the ResearchGate profile of King George Medical University(KGMU) available from 32 departments. Department of Urology, Paediatrics, Pathology and Neurology each has published 100 articles, followed by Department of Cardiology (75 articles), Department of Pharmacology (61 articles), Department of Paediatric Surgery (60 articles), Department of Pulmonary Medicine (55 articles), Department of Ophthalmology (53 articles), Department of Microbiology (53 articles), Department of Psychiatry (50 articles) while the Department of Anaesthesiology and Critical Care has uploaded least with only one article each.
Among the 1196 articles made available by KGMU faculty on ResearchGate Figure 5.3 shows the top 10 most productive years of the KGMU. In 2013, 245 papers were published, which makes it the most productive year of KGMU(Figure 1). Continuous growth in research productivity can be seen from 2005 to 2013, whereas non-uniform falls can also be observed after the year 2013 and before the year 2005(Figure 2).
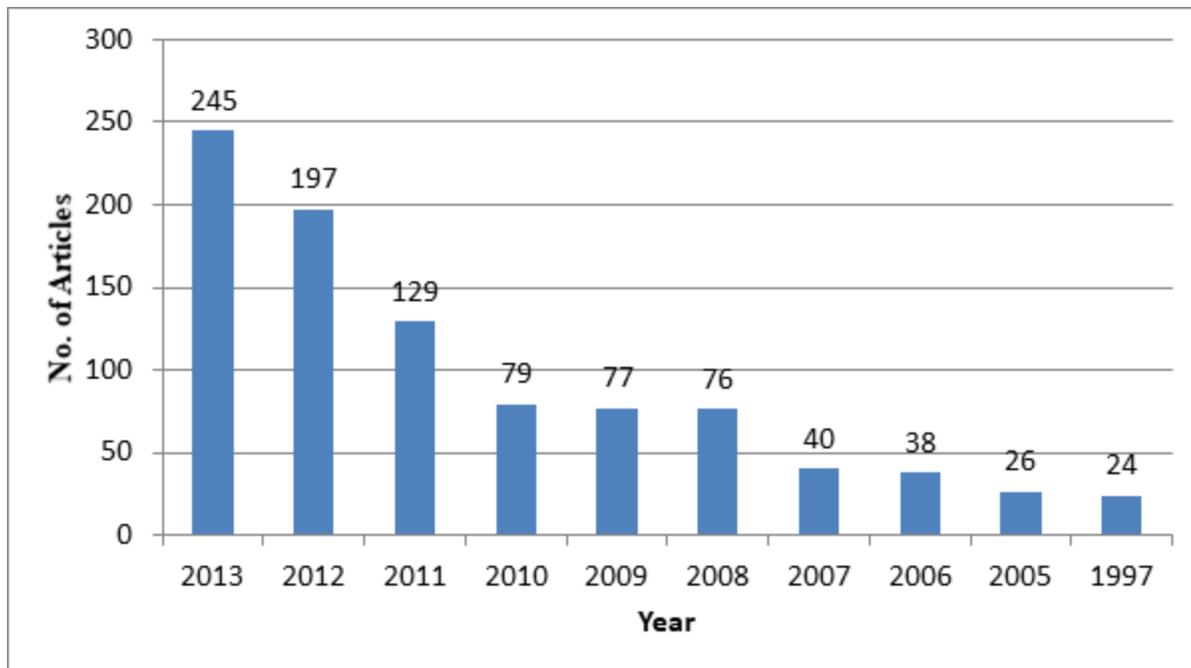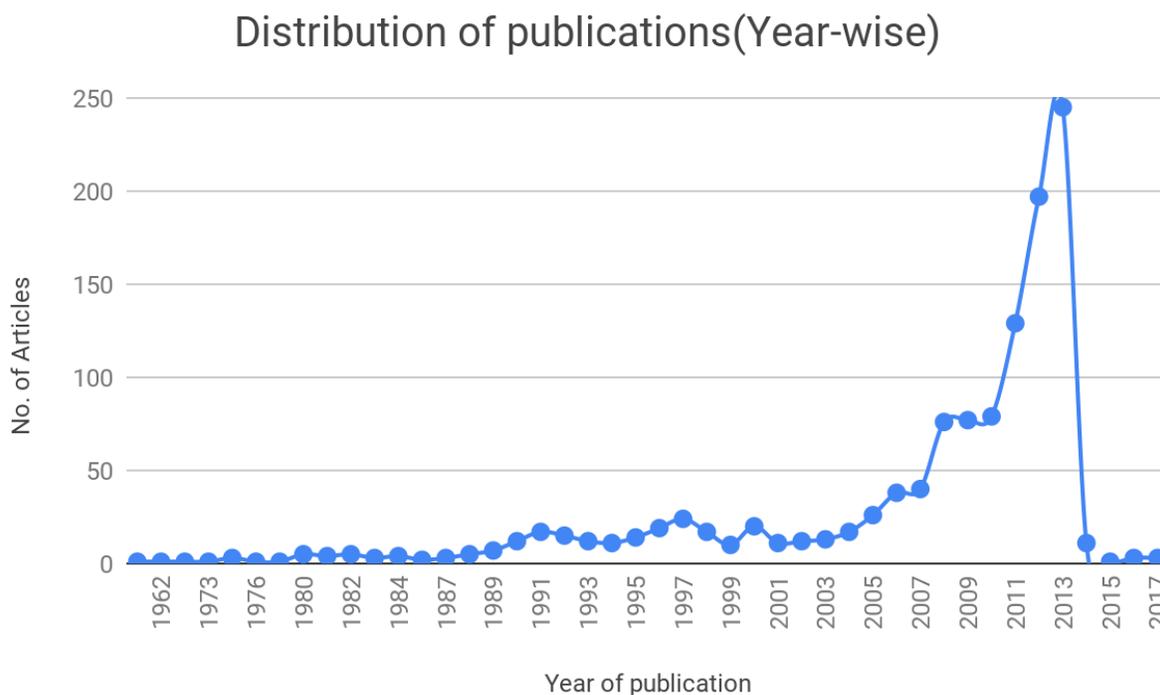
Figure 1: Most productive years

Figure 2: Year-wise distribution of publications.

Preferred Journals

Table 1 depicts the top ten highly preferred journals among the faculty members of KGMU. Overall, the faculty members at KGMU have published papers in 426 journals. Among the 426 journals, the BMJ Case Reports ranked as the highest preferred journal by faculty members

publishing 124 articles with 10.37% share of the total number of publications. Urology ranked second by publishing 42 articles with 3.51% share, followed by Indian Heart Journal by publishing 38 articles with 3.18% share, Indian Paediatrics publishing 32 articles with 2.68% share, Indian Journal of Psychiatry publishing 29 articles with 2.42% share.

Table 1: Rank list of ten highly preferred journals

Rank	Publisher Title	No. of Articles	% Share
1	BMJ Case Reports	124	10.37%
2	Urology	42	3.51%
3	Indian Heart Journal	38	3.18%
4	Indian Paediatrics	32	2.68%
5	Indian Journal of Psychiatry	29	2.42%
6	The Indian Journal of Medical Research	21	1.76%
7	The Indian Journal of Paediatrics	19	1.59%
7	National Journal of Maxillofacial Surgery	19	1.59%
8	Indian Journal of Ophthalmology	16	1.34%
9	Lung India	14	1.17%
10	Journal of Paediatric Surgery	11	0.92%
10	Indian Journal of Gastroenterology	11	0.92%

Preferred publication houses

Table 2 shows the top ten publishing houses preferred by KGMU faculty members. Among the total 426 publishers, the Elsevier ranked first with 89 articles followed by Medknow Publications, Wiley with 57 articles, and others. There were 87 publication houses with publishing one article each while nine publication houses published two articles each.

Table 2: Preferred publication houses

Rank	Publishing House	No. of Articles	% share
1	Elsevier	89	21%
2	Medknow Publications	57	13%
3	Wiley	37	9%
4	Springer Verlag	27	6%
5	Taylor & Francis	21	5%
6	SAGE Publications	17	4%
7	Springer Nature	15	4%
8	Lippincott, Williams & Wilkins	14	3%
9	BMJ Publishing Group	11	3%
10	Karger Publishers	9	2%
10	Oxford University Press (OUP)	9	2%

Accessibility of the Journals

Table 3 shows the accessibility of journals chosen by faculty members of KGMU in the open access and subscription-based access. It was observed that the KGMU faculty members prefer publishing more in the journals following the hybrid open access model with 243 journals(57%), followed by 113(27%) fully open access journals whereas the least preferred type of journals were subscription-based journals with 70(16%) articles.

Table 3: Accessibility of Journals

Accessibility	Number of Journals	% share
Hybrid Open Access	243	57%
Open Access	113	27%
Subscription-Based Access	70	16%
Grand Total	**426**	

Availability of full-text articles

To investigate the proportion of full-text availability of publications on ResearchGate out of the total publications. It was found that 418(34.9%) full-text articles are available out of a total of 1196 articles and no full text was available for 778(65.1%) articles(Figure 3).
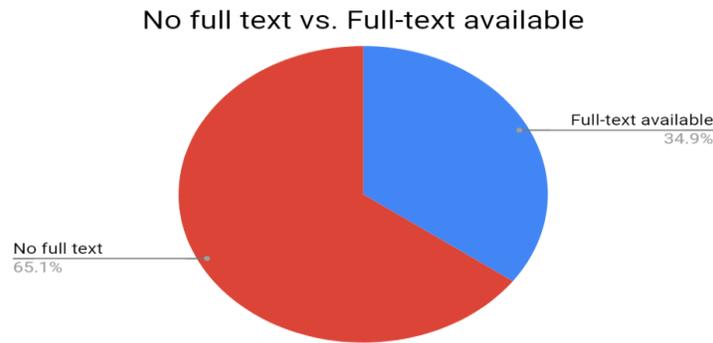

Figure 3: Full-text availability

Archiving policy of publishers
Another aim of the study was to explore the archiving policies of publication venues preferred by KGMU faculty allowing authors to make their publications available regarding either the publisher version, reprint or archiving on other platforms such as academic social networking sites or institutional repositories. The colour coding of each publication venue title was checked on the SHERPA/RoMEO database to check the archiving policy.

Table 4: Archiving policy and full-text availability of articles

Sherpa/Romeo Colour code category	Availability		
	Full-text available	**No full text available**	**Total**
Green	314	494	808
Yellow	46	176	222
Ungraded	39	65	104
White	11	20	31
Blue	5	16	21
No Record	3	7	10
Grand Total	**418**	**778**	**1196**

Out of 1196 articles, the highest 808(67.56%) articles were found belonging to RoMEO colour green archiving policy, that allows the authors to archive pre-print and post-print both. Among these green coded articles, 314 full-text were available on ResearchGate while for 494 articles, full-text was not available(Table 4). The second highest articles amounting to 222(18.56%) found belonging to RoMEO colour yellow archiving policy, that allows the authors to archive only the pre-print of their articles. Among these yellow coded articles, 46 full-text were available on ResearchGate while for 176 articles full-text was not available. The third highest articles amounting to 104(8.7%) found belonging to RoMEO colour ungraded archiving policy, for which the archiving policy was not available on the RoMEO database, necessary efforts made to ascertain the archiving policy by visiting the individual publisher websites but could not be determined. For publishers with RoMEO colour white, that formally do not allow authors to archive any version, a total of 31(2.59%) articles were found out of which 11 full-text were

available and 20 articles were without their full-text. Similarly, for the publishers with RoMEO colour blue, that allows authors to upload post-print, five full-text and for 16 no full-text articles are available of a total 21(1.76%) articles. Ten articles were found with no record on RoMEO out of which three articles full-text were available while seven articles full-text were not available on ResearchGate.
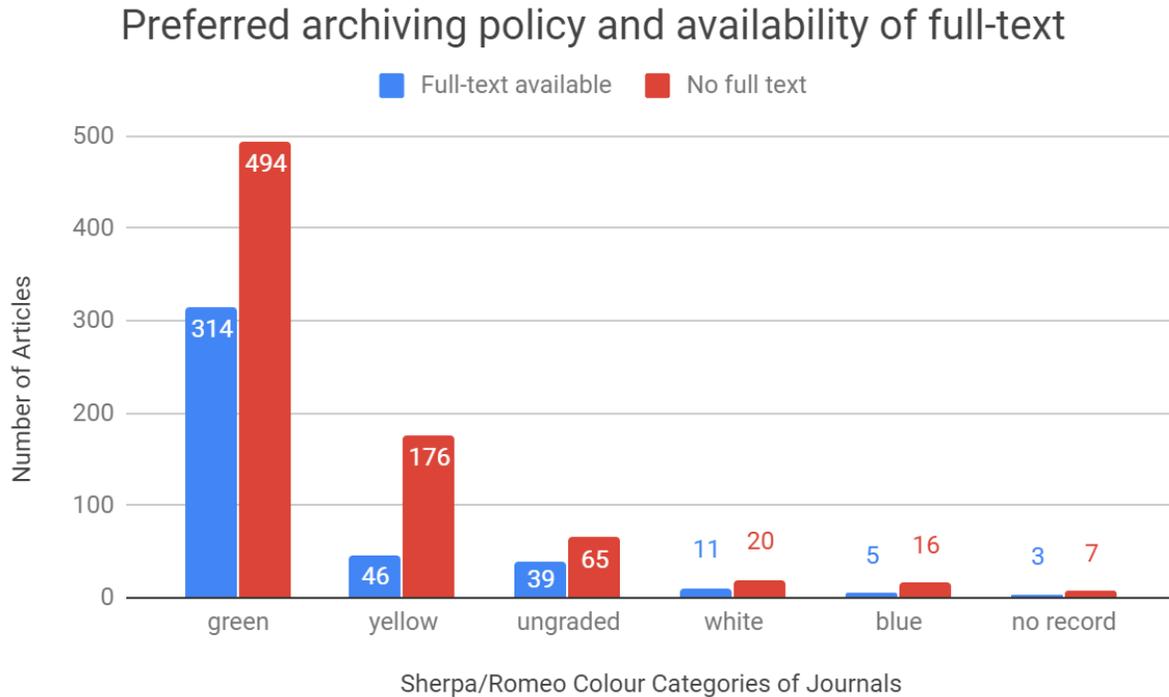

Figure 4: Preferred archiving policy and availability of full-text

Fig. 4, indicates that articles published in green coloured categories are more in both full-text available and no full-text classes.

Authorship Pattern
Table 6, shows that 39.21% (469) articles are written by five or more than five authors, followed by three and four authored papers making up 22.49% and 22.32%, respectively. 61.54% articles are authored by four or more than four authors, whereas the share of single-authored papers found to be mere 3.76%.

Table 5: Authorship pattern

Number of Authors	Number of articles	% Share
1 author	45	3.76%
2 authors	146	12.21%
3 authors	269	22.49%

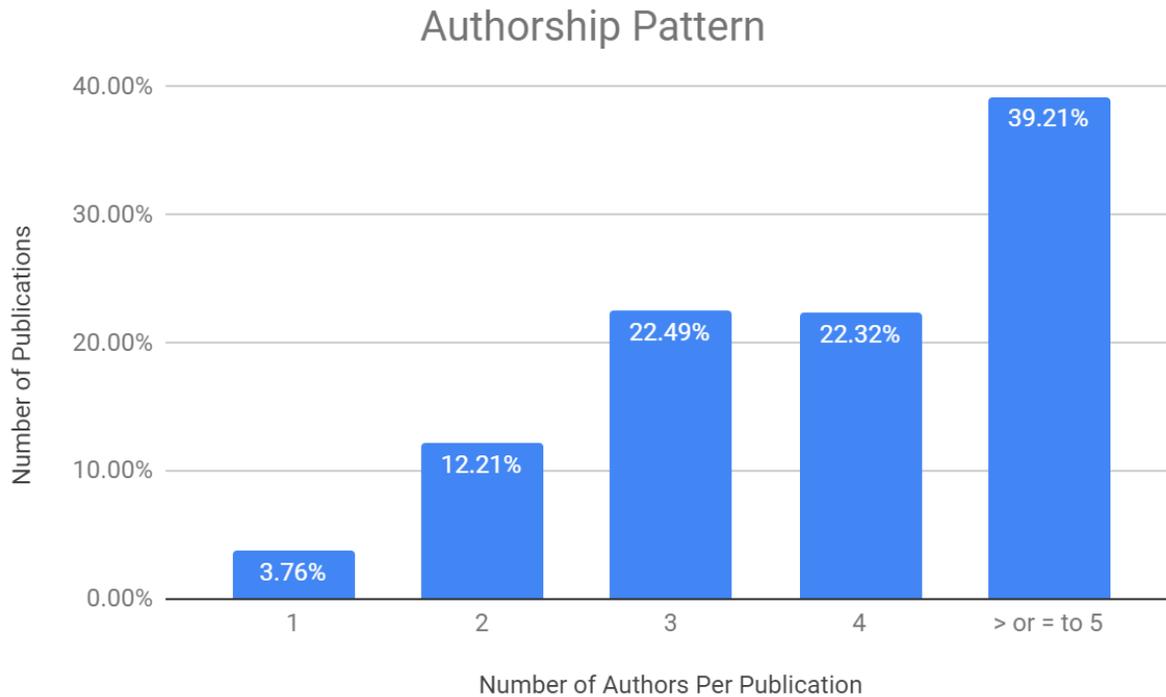|		
4 authors	267	22.32%
More than or equal to 5 authors	469	39.21%
Total	**1196**	

Authorship Pattern

Figure 5: Authorship pattern

Fig. 5, denotes the dominance of team research and a high level of collaboration among the faculty members of KGMU while communicating research findings.

Discussion

The findings of the study show that the Department of Urology, Department of Paediatrics, Department of Pathology and Department of Neurology are highly productive departments out of the total 32 departments in KGMU whose profiles are available on ResearchGate.
Among the articles uploaded by KGMU faculty on ResearchGate, the most productive year was 2013, whereas a continuous growth can be seen from 2015 to 2013 with non-uniform falls observed before 2005. This may be because of the unavailability of publications on ResearchGate for that period.
The KGMU faculty members prefer publishing in BMJ(British Medical Journal) Case Reports the most, that specialises in publishing the case reports. Other journals, such as Urology, Indian Heart Journal, Indian Paediatrics and Indian Journal of Psychiatry also are among the top ten

preferred journals. This shows that the faculty members prefer to publish their scholarly output in case reports followed by Indian origin journals. The findings are of significance to the medical librarians to select core journals while making subscription decisions.

Among the publishing houses, Elsevier published the maximum number of journals preferred by KGMU faculty members, followed by Medknow Publications, Wiley, Springer Verlag, Taylor & Francis, Sage Publications, Springer Nature, and others. The results show that KGMU faculty members prefer publishing in journals published by reputed publishing houses. Another reason might be that since Elsevier and Medknow Publications majorly publish medical journals they came out to be most preferred publishing houses. Although it was also observed that some faculty members published in less famous publishers but in limited numbers (either an article or two articles).

It was also interesting to note whether the KGMU faculty members give due importance on the open accessibility of journals while publishing their articles. It was found that 57% of articles were published in hybrid open access journals followed by fully open access journals 27% whereas KGMU faculty members least preferred the subscription-based journals. This could be explained with the fact that since most of the preferred journals are published by Elsevier and Elsevier recently declared almost all of its journals as Hybrid open access journal wherein the authors have a payment option to make their publications in open access. This finding need to be further evaluated using survey or personal interview to know the reasons for the majority of faculty members for selecting hybrid, open or subscription-based journals.

Out of the total available articles, 65.1% articles full-text version is not available whereas for 34.9% articles the full-text is available on ResearchGate. Whereas if we look at the archiving policy of publishers, it was found that 67.56% articles were found belonging to green archiving policy publishers that allow authors to upload pre and post-print both on personal, institutional or any other archiving platforms followed by yellow(18.56%), ungraded(8.7%), white(2.59%) and blue(1.76%) colour-coded archiving policy, respectively. This shows that majority of publishers in which the faculty members publish allow the authors to upload the pre-prints and post prints of the publications. But as stated in the last paragraph, only 34.9% of the articles full-text were available. This shows that KGMU faculty members are hesitant to upload the full-text of their papers on ResearchGate although most of the publishers archiving policy allow to do so. This may be due to probable reasons, such as no time to upload full-text due to busy schedules as KGMU is one the popular healthcare center for the region it serves as on average 10,000 new patients attending the OPD every day or some of the faculty members might be unaware that the full-text can be uploaded or some might be confused about the publisher copyright restrictions. The reasons could be ascertained by communicating them personally through an interview or survey.

The data shows that The KGMU faculty members prefer publishing in teams as it was found that four or more than four authors published 61.54% articles whereas single-authored papers found to be mere 3.76% articles. This finding shows that there is a high level of collaboration exists among the faculty members or scholars at the KGMU. However, there can be other reasons too, such as gifted authorship, or mandatory professor or director name in every manuscript. This need to be further evaluated in depth considering the roles of each author and other parameters.

The major limitation of the study is that with the pace of time more researchers may join ResearchGate, thus the number of member profiles and their contribution on ResearchGate will increase therefore differences in data sets, results and findings can be seen in the future. Another

limitation is that the study has been conducted only on the members of the departments of KGMU having their profiles on ResearchGate. There are fair chances that some departments do not have their profiles on ResearchGate and some faculty members do not update their RG profiles regularly. This, however, provides further scope for research using another sample by size, time-period or by characteristics.

Conclusion

The present study has been conducted to carry out an altmetric analysis of the ResearchGate profiles of the faculty members of King George's Medical University, Lucknow. ResearchGate is an academic social networking site which is meant for scientists and scholars enabling them to share, communicate, collaborate, connect and get updated with the feeds and scholarly information. The ResearchGate consolidates the publications of an institute based on the affiliation data available from user-profiles and calculates various metrics. The analysis of the profiles shows that there are 32 departments listed under KGMU and in total 1196 articles were published by them and made available on their profiles (according to the data retrieved from the website in the first week of February 2019). Four departments have published an equal number of articles. BMJ Case Reports (British Medical Journal) became the most preferred and productive journal among the faculties of KGMU. The study shows that only 34.9% article's full-text is available on ResearchGate.

The significance and relevance of this study are that it highlights the scholarly publishing patterns of the medical researchers, faculty and scholar for the scientific and academic exchange of communication and research output. The findings of the study have high relevance for the health library professionals in understanding the publishing behaviour of medical academics and making informed decisions while subscribing electronic resources for their users.

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