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## Comparing the Presence of Researchers of Medical Universities of Western Provinces of Iran on ResearchGate and Scopus

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### Abstract

The aim of the present study was to compare the presence of researchers of Medical Universities of Western Provinces of Iran (i.e., Kurdistan, Hamadan, Kermanshah, and Ilam) on ResearchGate and Scopus using altmetric approach. This research also aimed to identify the significant difference between the Scopus indicators and the altmetric indicators of ResearchGate. The statistical population of this research consists of the researchers from University of Medical Sciences in Kurdistan, Hamadan, Kermanshah and Ilam with indexed documents in Scopus and

affiliated with ResearchGate that were compared and reviewed by the author's work on ResearchGate. According to Scopus, Kurdistan University of Medical Sciences had the highest average number of documents, Hamadan University of Medical Sciences has the highest average h-index, and Kermanshah University of Medical Sciences had the highest average citation count. Based on the number of publications, Ilam University of Medical Sciences had the highest average, based on the ResearchGate Score (RG Score), Kurdistan University of Medical Sciences had the highest score and based on the following and followers indicators, Kermanshah University of Medical Sciences received the highest score. Increasing the number of documents uploaded on ResearchGate will increase the citations in Scopus and, consequently, the *h-index* will increase.

## Keywords

Altmetrics; Citation analysis; ResearchGate; Scopus; Universities; Medical Sciences; Iran

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## Introduction

Over the last two decades, the process of accessing scientific information has been well advanced due to improvements in marketing tools (search engines, databases, publishers lists, online lists, messaging services, etc.) and with the increase in the amount of electronic information, End users have more access. However, due to the broad and specialized nature of science in different fields, specialists are still insufficiently satisfied with access to their specialized resources, and in many cases they are dissatisfied with the inability to interact with databases in many ways. At the same time, over the years a new paradigm of communication and Internet interactions has emerged as social media. This type of Web2-enabled media facilitates interaction between users and enables the presence of people and pave the way for user centered approach. In fact, it has created a new platform for collaboration between users (Asnafi, Salami, Siah Bargard, & Hosseini Ahangari, 2015).

Social networks as one of the most important new tools with their capabilities affect different aspects of people's scientific activities. These networks not only enable communication between members but also facilitate access and interaction of knowledge resources by removing time and space constraints. Due to the proliferation of content and the variety of software and Internet capabilities, these networks have received widespread acceptance by users. These networks are based on interoperability, collaboration and partnerships, and although most of these networks are used for entertainment purposes, other aspects of these networks' functions are currently highly emphasized (Machin Mastromatteo, 2012).

Some of the networks are privately owned and created for specific purposes, including LinkedIn, ResearchGate, Mendeley, Zotero, Academia, CiteULike, and ImpactStory, which developed in

order to share scientific collaborations. Unlike scientometric studies that require access to expensive citation databases such as Web of Science (WoS) and Scopus, altmetric studies can be done based on the data extracted from free databases.

Ponte and Simon (2011) stated that one third of the professionals use specialized social networks, so their tendency to use these networks is tangible. But the extent to which Iranian researchers keep themselves up-to-date with new technology and use it solely to interact with scientific issues is a challenge specific to the changing digital world. In this paper, we try to compare the Presence of Researchers of Medical Universities of Western Provinces of Iran on ResearchGate and Scopus.

On the other hand, the evidence suggests that participation of researchers affiliated with research organizations in scientific social networks and sharing of their articles with related links, increases the number of visits to the websites of their relevant organizations. Even in some cases the percentage of evaluation of such articles has been published by search engines (Kelly, 2012). Therefore, another issue to be addressed in this study is to examine the statistical relationship between the *h-index* as well as the citation score in the Scopus database, and other indicators such as the citation count and the ResearchGate Score (RG Score). The RG Score examines how participation in a social network affects the number of citations received in the Scopus database.

## Research background

Niazmand, Ebrahimi and Jowkar (2013) in a comparative study, examined the extent to which Middle Eastern researchers have used online social networks. Batooli (2017) investigated the capabilities of the research Scientific Social Networks to facilitate research activities from the perspective of Iranian medical scientists. Yaghoubi Malal, Jamali Mahmoei and Mansourian (2016) identified the information motivations and interactions of scientists on ResearchGate. Sotodeh and Saadat (2015) investigated the tendency of Iranian chemists to join a social network based on its characteristics, production of science and its recognition. Erfanmanesh, Amirreza and arshadi (2015) determined the attendance and activities of Iranian Research Universities and Institutions on ResearchGate.

Review of literature on this subject revealed that Chakraborty (2012) examined the reasons for using ResearchGate among Indian academic researchers. Madhusudhan (2012) in his survey examined a total of 160 Delhi University researchers that utilized the social networks. Nández and Borrego (2013) carried out a case study on the use of social networks for scientific purposes. Thelwall and Kousha (2014) evaluated ResearchGate. Their purpose was to determine whether the use of ResearchGate and the dissemination of information broadly reflects the hierarchy of academia and whether different countries recognize its benefits. Also, Mohammadi and Thelwall (2014) found a significant relationship between the number of article readers in Mendeley and

the number of citations received in the citation databases in their research, and that Mendeley social network can be used to help transfer knowledge between different disciplines and ultimately to receive more citations for articles used by researchers.

## Materials and Methods

The statistical population of this study is consisted of researchers from medical universities of Western Provinces of Iran (i.e., Kurdistan, Hamadan, Kermanshah and Ilam), whose works were indexed in the Scopus citation database during the period of 2000 to the end of 2018 and were members of the ResearchGate Scientific Social Network. The data were collected from researchers' profiles in January 2018. For this research, all researchers from Kurdistan, Hamadan, Kermanshah and Ilam University of Medical Sciences (based on the institutional affiliation of the studied universities) were recruited based on their information and profiles in Scopus and ResearchGate. Research data were collected from Scopus and ResearchGate. Scopus was used to collect the authors' personal and scientific information, and the information contained in each author's profile on ResearchGate was also considered as altmetric indicators. The data collection steps are as follows;

1. Researchers from Kurdistan, Hamadan, Kermanshah and Ilam University of Medical Sciences were selected based on the institutional affiliation of the studied university.
2. To gather information in Scopus, researchers of the studied universities were searched in Scopus and their information was collected. At this stage, the research profiles of researchers of Iranian medical universities were used.
3. Each researcher was searched individually on ResearchGate with information such as name, surname, university name and discipline, to determine whether or not they were members of this social network. Then the researchers who were members of ResearchGate were identified and their indicators were evaluated.
4. Finally, the relationship between the Scopus indicators (the number of documents, citations and the *h-index* of researchers) and ResearchGate indicators (number of visits, followers and following) was investigated and compared.

Data analysis was performed in two parts: descriptive and inferential statistics. Descriptive statistics used statistics such as frequency, mean and standard deviation of variables in universities, to describe the distribution and expression of general characteristics of the population. We used inferential statistics, to investigate the relationships between variables and perform statistical tests to examine the significance of this relationship. In the descriptive statistics, The Statistical Software of Social Sciences (SPSS) was used; and in the inferential statistics analysis, the SPSS software was used to examine the significance of data differences.

## Findings

### a) Statistical description of the research community

Table 1 shows the number of researchers and their indexed documents by faculty.

**Table 1. Frequency of researchers and number of documents by faculties**

Universities	Faculties	Number of researchers	Number of documents
Kurdistan University of Medical Sciences	Health	18	<b>465</b>
	Nursing and Midwifery	30	<b>140</b>
	Medical	164	<b>1601</b>
	Paramedical	17	<b>75</b>
	Dentistry	24	<b>19</b>
	Total	253	<b>2300</b>
Hamadan University of Medical Sciences	Health	40	<b>1711</b>
	Nursing and Midwifery	34	<b>324</b>
	Medical	230	<b>3409</b>
	Paramedical	28	<b>177</b>
	Dentistry	69	<b>399</b>
	Pharmacy	25	<b>392</b>
	Rehabilitation Sciences	26	<b>127</b>
	Total	452	<b>6539</b>
Kermanshah University of Medical Sciences	Health	36	<b>1290</b>
	Nursing and Midwifery	37	<b>208</b>
	Medical	274	<b>3157</b>
	Paramedical	36	<b>195</b>
	Dentistry	45	<b>157</b>
	Pharmacy	39	<b>1129</b>
	Nutrition Sciences and Food Technology	8	<b>138</b>
	Total	475	<b>6274</b>
Ilam University of Medical Sciences	Health	23	<b>415</b>
	Nursing and Midwifery	20	<b>190</b>
	Medical	96	<b>1055</b>
	Paramedical	9	<b>85</b>
	Dentistry	27	<b>24</b>
	Total	175	<b>1769</b>
	<b>Total Sum</b>	1355	<b>16882</b>

In total, at the four universities surveyed, 1355 employed researchers have 16882 indexed documents in Scopus by the end of 2018. As Table 1 shows, Kermanshah University of Medical Sciences has 4774 researchers with 6274 documents, Hamadan University of Medical Sciences has 452 researchers with 6539 documents, Kurdistan University of Medical Sciences has 233 researchers with 2300 documents and Ilam University of Medical Sciences has 175 researchers with 1769 documents in Scopus.

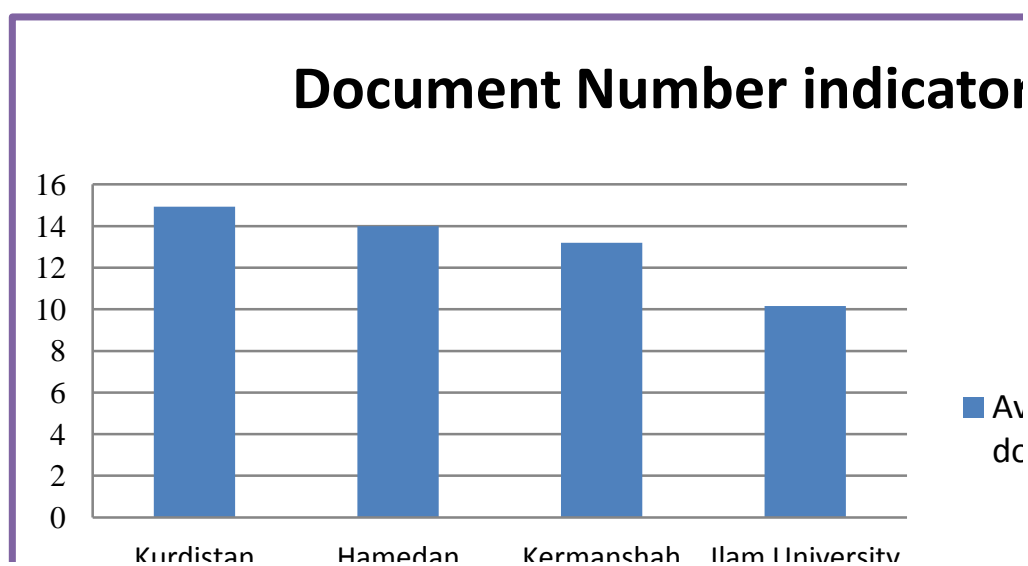
## b) The statue of researchers in Scopus

Table 2 shows the status of researchers of medical universities of western provinces of Iran in Scopus.

**Table 2. Descriptive statistics of researchers of Kurdistan, Hamadan, Kermanshah and Ilam University of Medical Sciences in Scopus**

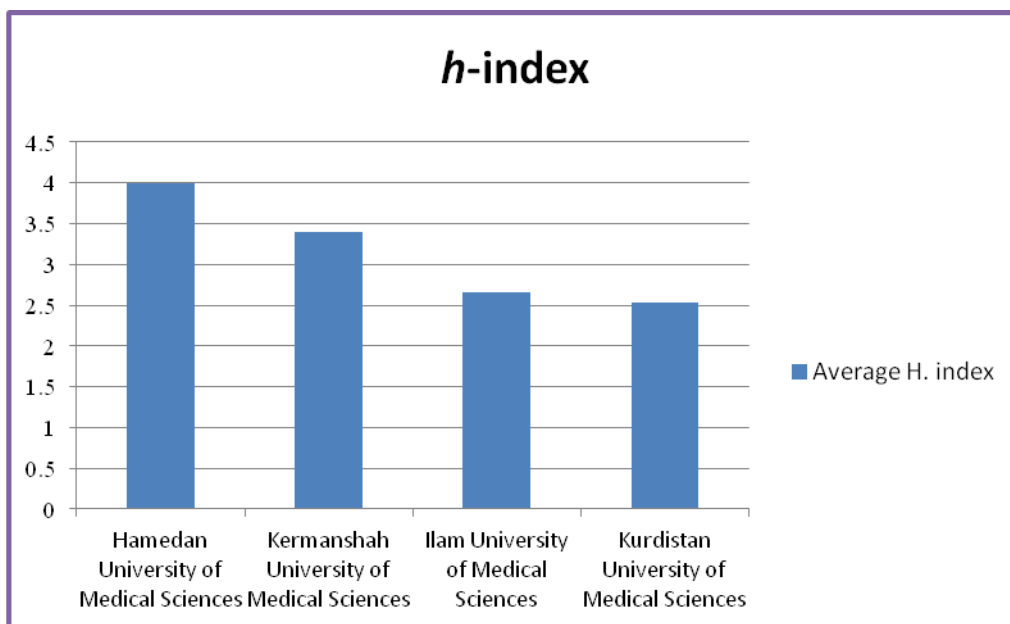
University	Number of documents		H-index		Citation count	
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation
Kurdistan University of Medical Sciences	14.93	2.99	2.53	2.99	48.89	114.89
Hamadan University of Medical Sciences	14.00	20.92	4.00	3.82	94.42	205.72
Kermanshah University of Medical Sciences	13.20	20.52	3.39	3.90	86.01	196.49
Ilam University of Medical Sciences	10.16	21.50	2.65	3.41	52.02	147.07
Total	13.07	16.48	3.14	14.12	70.33	37.78

Analysis of data collected from Scopus and the research profiles of researchers of medical universities in Table 2 shows that based on the number of documents, Kurdistan, Hamadan, Kermanshah and Ilam University of medical sciences have the highest and lowest averages, respectively. Also, Hamadan University of Medical Sciences had the highest and Kurdistan University of Medical Sciences had the lowest h-index. Based on the citation count, Hamadan University of Medical Sciences had the highest citation score and Kurdistan University of Medical Sciences had the lowest citation count.



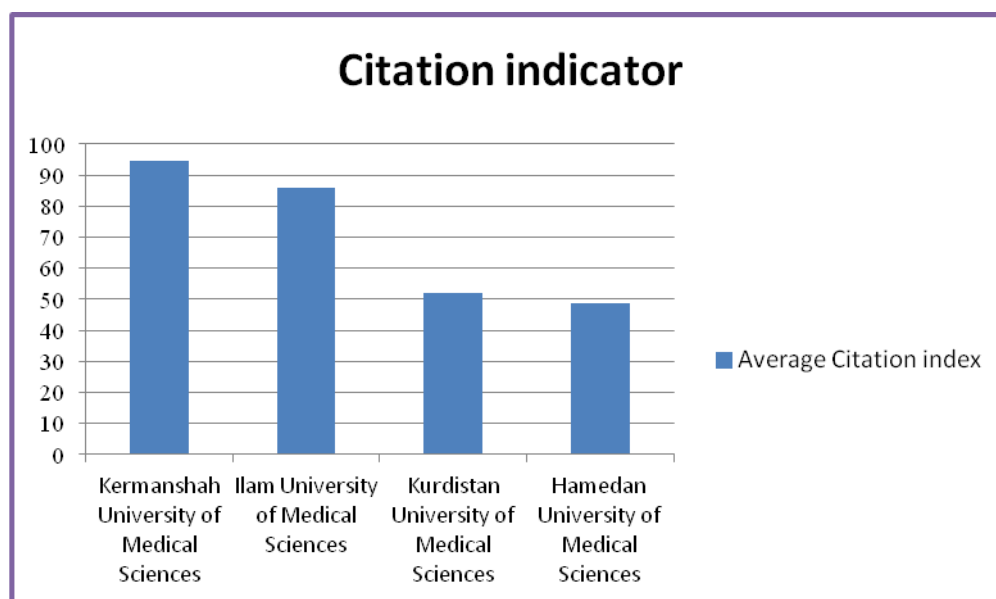
**Figure 1. The average number of documents based in Scopus**

As shown in Figure 1, Kurdistan, Hamadan, Kermanshah and Ilam university of Medical Sciences have the highest and the lowest average number of documents in Scopus, respectively.



**Figure 2. Average h-index based in Scopus**

According to the data presented in Figure 2, the highest and lowest averages for the *h*-index, were Hamadan, Kermanshah, Ilam and Kurdistan University of Medical Sciences, respectively.



**Figure 3. Average citation index in Scopus**

Figure 3 shows that the researchers of Kermanshah University of Medical Sciences have the highest average citations, followed by Ilam, Kurdistan and Hamadan universities.

### C) The status of the researchers' on ResearchGate

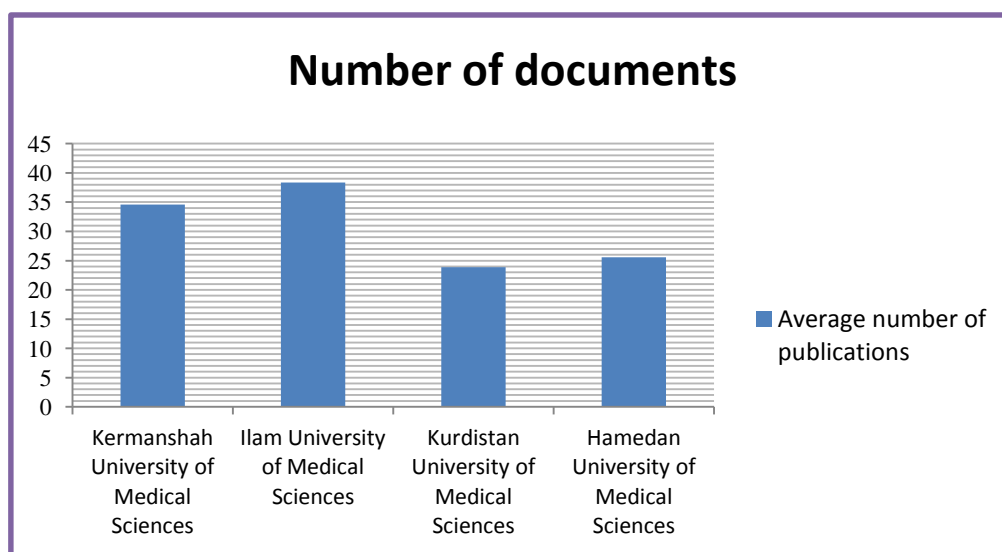
**Table 3. Statue of Researchers of the studied universities on ResearchGate**

		<b>Kurdistan</b>	<b>Hamadan</b>	<b>Kermanshah</b>	<b>Ilam</b>
<b>Publications</b>	Average	23.89	25.59	34.56	38.33
	Standard Deviation	567.77	33.44	1886.81	4608.45
<b>Number of visits</b>	Average	2416.61	2800.74	4182.87	3848.41
	Standard Deviation	9323465.9	5080.17	102492397.5	54367832.8
<b>Citation count</b>	Average	128.71	151.25	182.59	175.77
	Standard Deviation	33529.31	300.25	132502.7	104088.8
<b>RG Score</b>	Average	28.49	23.23	21.92	12.23
	Standard Deviation	290.89	140.47	14277.06	113.39
<b>Following</b>	Average	42.22	36.36	45.54	46.94
	Standard Deviation	3845.97	64.20	6338.61	4806.51
<b>Followers</b>	Average	37.25	33.22	49.25	43.94
	Standard Deviation	1153.19	42.07	2955.74	2868.16
<b>H-index</b>	Average	4.53	4.42	5.18	4.72
	Standard Deviation	11.61	4.13	17.20	21.46

The results of Table 3 show that in the field of publications, Ilam University of Medical Sciences has the highest average score of 38.33. In the visit rate index, Kermanshah University of Medical Sciences has the highest average score of 4182.87. Based on the citation count, Kermanshah University of Medical Sciences has the highest score of 182.59. From the RG score point of view, Kurdistan University of Medical Sciences obtained the highest of score of 28.49. Also, Kermanshah University of Medical Sciences had the highest score among other universities in terms of the number of followers and followings index. In terms of *h-index*, Kermanshah University had the highest average score of 5.18.

### d) Altmetric indicators on ResearchGate

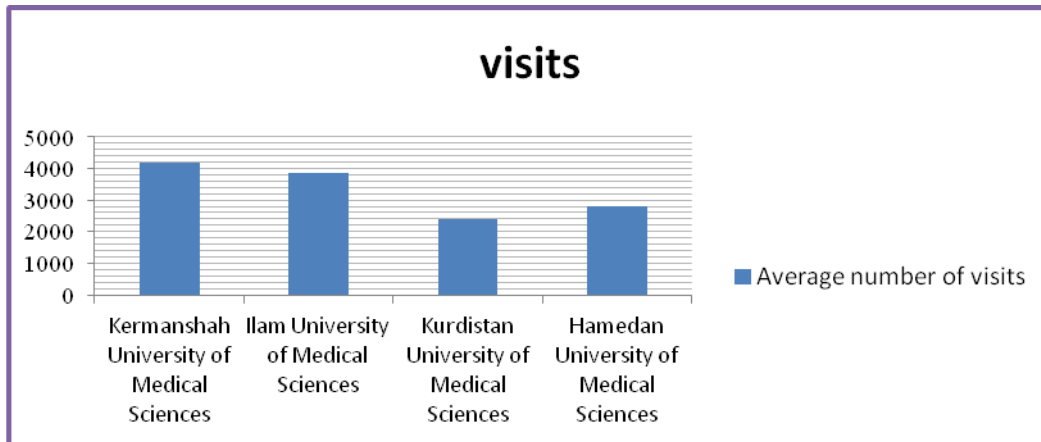
The following figures show the average altmetric indicators on ResearchGate for universities.



**Figure 4. The average number of publications on ResearchGate**

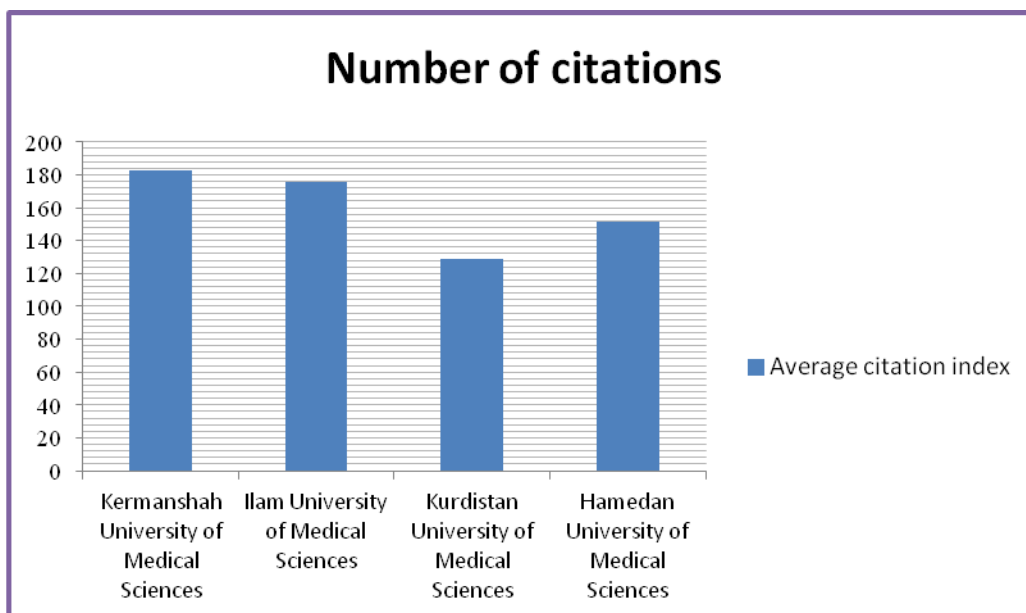


As can be seen in Figure 4 in terms of the number of publications, Ilam University of Medical Sciences has the highest number of publications, followed by Kermanshah, Hamadan and Kurdistan University of Medical Sciences. Figure 5 shows the average number of visits by universities on ResearchGate.



**Figure 5. The average number of visits to ResearchGate**

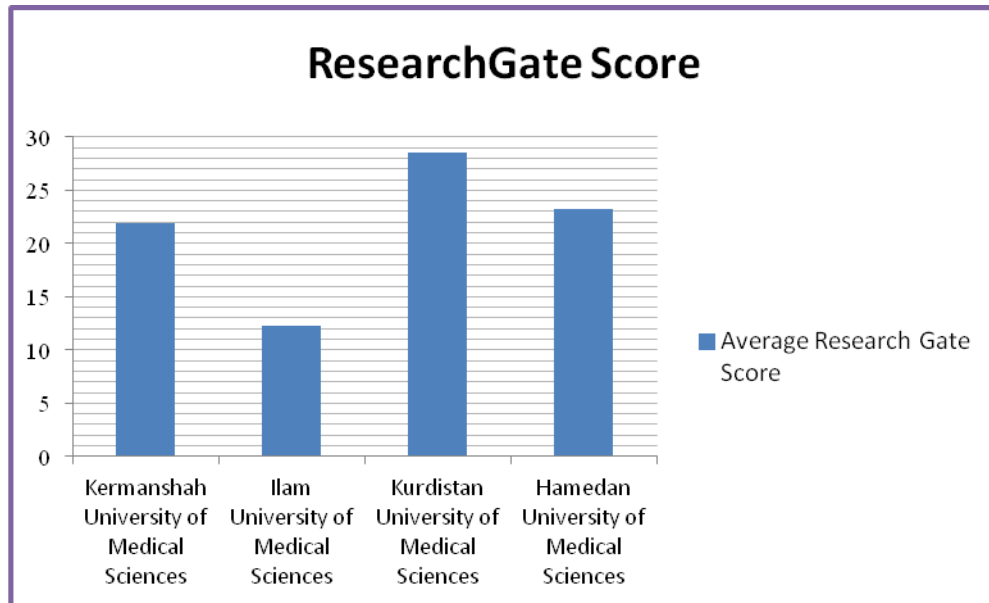
As can be seen in the Figure 5, in term of the average number of visits to ResearchGate, Kermanshah University of Medical science has the highest number, followed by Ilam, Hamadan and Kurdistan Universities of Medical sciences. Figure 6 shows the average citations of universities on ResearchGate.



**Figure 6. Average citation index on ResearchGate**

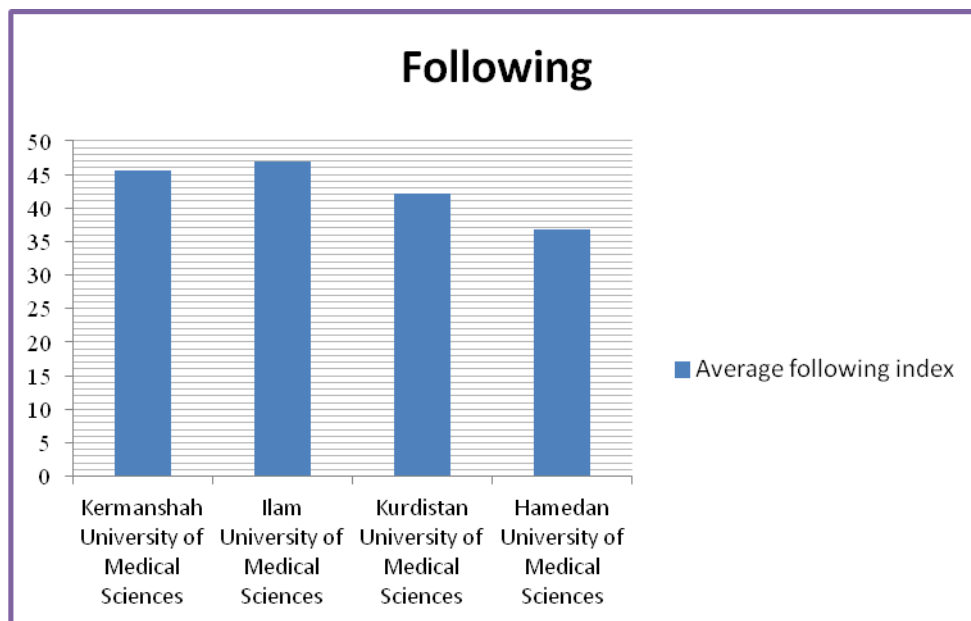
Kermanshah University of Medical Sciences is positioned at the top of the list of universities in terms of average number of citations, same as number of visits, followed by Ilam, Hamadan and

Kurdistan Universities of Medical Sciences. Figure 7 shows the average citation count on ResearchGate for different groups.



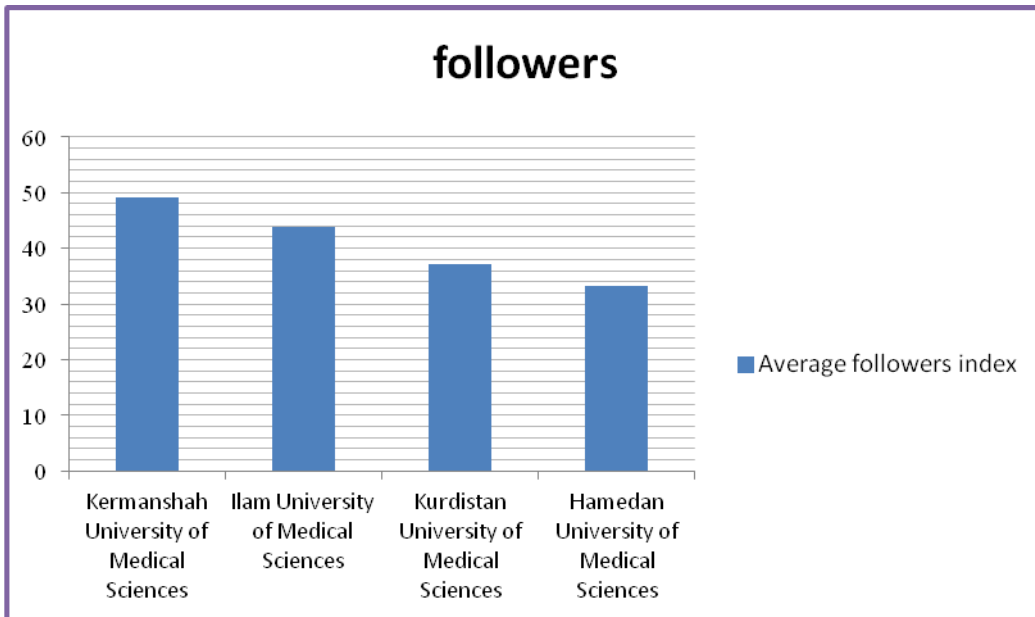
**Figure 7. The average number of RG Score for Universities of Medical Sciences**

As the Figure 7 shows, in term of the average ResearchGate Score, Kurdistan University of Medical Sciences had the highest number followed by Hamadan, Kermanshah and Ilam universities. Figure 8 shows the average of followers on ResearchGate for the studied universities.



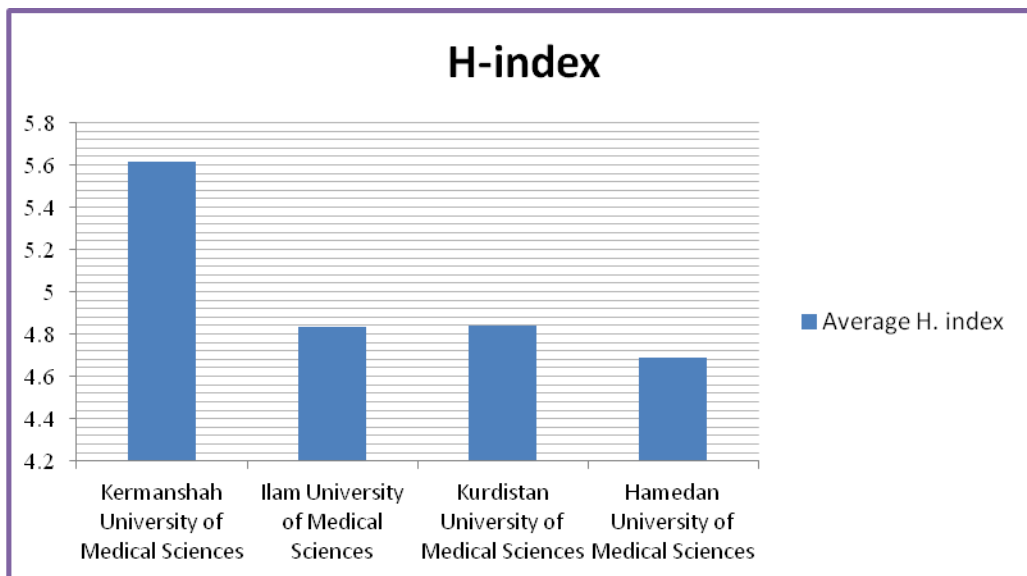
**Figure 8. The average number of following on ResearchGate**

Figure 9 shows the average of followers of the studied universities on ResearchGate.



**Figure 9. The average number of followers on ResearchGate**

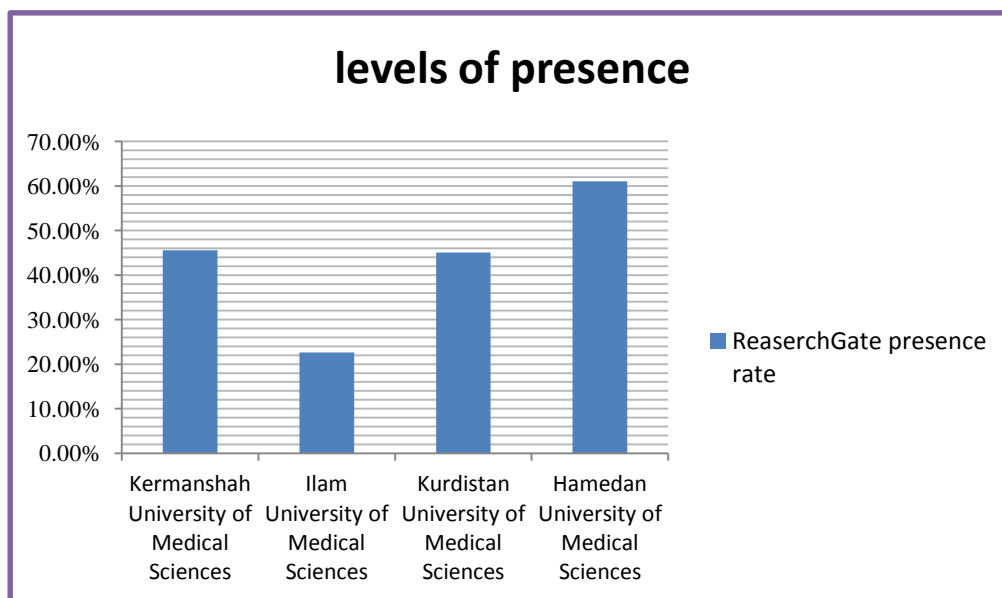
Figure 10 shows the average *h*-index of researchers for studied universities on ResearchGate.



**Figure 10. The average h-index on ResearchGate**

**e) Investigating the differences between universities and comparing the levels of presence on ResearchGate by universities' researchers based on altmetric indicators**

This section examines the differences in the levels of researchers' presence and activity of studied universities on ResearchGate.



**Figure 11. The levels of university researchers' presence on ResearchGate**

According to Figure 11 and in term of the levels of researchers' presence on ResearchGate; Hamadan University of Medical Sciences with 61.06 percent is in the first rank, Kermanshah University of Medical Sciences with 45.60 is in the second rank, Kurdistan University of Medical Sciences with 45.09 is in the third rank and Ilam University of Medical Sciences with 22.60 percent is in the last rank. University significant differences and variance test were used to investigate the authors' levels of presence on ResearchGate. For the average test, taking into account all indicators of ResearchGate, the author's rank among all individuals was determined in each item, and then the mean ratings were calculated for each individual, then the Kruskal-Wallis H test was used. The null hypothesis indicated no difference between universities and the alternative hypothesis indicated the difference between universities. The Kruskal-Wallis H test output indicates that the significance level is less than 0.05, so the null hypothesis is rejected and as a result there is a significant difference between universities in the use of ResearchGate. Table 8 shows the mean rank of the groups in using ResearchGate.

**Table 4. Mean rank of Universities**

Universities	Mean rank
Hamadan	383.20
Kermanshah	277.67
Kurdistan	259.54
Ilam	237.71

According to Table 4, the number of researchers on ResearchGate based on altmetric indicators is as follows: Hamadan University of Medical Sciences was in the first rank (mean rank = 383.20), Kermanshah University was in the second rank (mean rank = 277.67), Kurdistan University was in the third rank (mean rank = 259.54) and Ilam University of Medical Sciences was in the fourth rank (mean rank = 237.71). The variance of the statistics of the researchers'

altmetric items from different universities were compared separately. For the Homogeneity of variances test, Levine test was used. This test measures the homogeneity statistical hypothesis. The null hypothesis indicated the homogeneity of the variances of universities and the alternative hypothesis indicated the heterogeneity of the variances of universities.

**Table 5. Levine test results for altmetric items**

Item	Levine statistics	Significance level
Publishers	67.432	<b>0.000</b>
Number of visits	13.609	<b>0.000</b>
Citation score	87.324	<b>0.000</b>
RG Score	3.21	<b>0.000</b>
Following	2.387	<b>0.000</b>
Followers	2.01	<b>0.000</b>
H- index	68.279	<b>0.000</b>

According to the results of Levine test, the variances of the items are not equal and Analysis of variances cannot be used for comparison. Therefore, Kruskal-Wallis H nonparametric test was used for all items to compare universities.

**Table 6. Levine test results for Altmetric items**

	Hamadan University	Kermanshah University	Kurdistan University	Ilam University
<b>Number</b>	275	214	111	<b>35</b>
<b>Average</b>	2.13	2.31	3.096	<b>3.36</b>
<b>Standard deviation</b>	0.600	0.529	0.255	<b>0.55</b>
<b>Maximum differences</b>	0.130	0.180	0.133	<b>0.137</b>
<b>Positive</b>	0.130	0.180	0.132	<b>0.071</b>
<b>Negative</b>	-0.085	-0.090	-0.133	<b>-0.137</b>
<b>Kolmogorov-Smirnov test statistic</b>	1.61	2.24	1.65	<b>1.705</b>
<b>Significance level</b>	0.011	0.000	0.01	<b>0.003</b>

According to the Table 6, the significance level for the components of the variables was level less than 0.05, and this level has a significant difference with normal distribution and variables distribution was not normal, so Kruskal–Wallis H nonparametric tests were used.

**Table 7. Kruskal-Wallis H test output for universities comparison**

Item	Chi-squared test statistic	Degrees of freedom	Significance level
<b>Publications</b>	259.708	3	<b>0.000</b>
<b>Number of visits</b>	6.355	3	<b>0.096</b>
<b>Citation score</b>	161.669	3	<b>0.000</b>
<b>RG Score</b>	63.077	3	<b>0.000</b>
<b>Following</b>	14.665	3	<b>0.002</b>
<b>Followers</b>	25.505	3	<b>0.000</b>
<b>H- index</b>	6.308	3	<b>0.110</b>

According to Table 7, the significance level of the number of visits and h-index is more than 0.05, so there is no difference between the two items but in other items the significance level is less than 0.05 and there is a significant difference between universities based on these items.

#### f) Correlation coefficient between the h-index in Scopus and the RG Score

Pearson correlation coefficient was used to examine the relationship between universities. Given the value obtained for the correlation coefficients and the significance level, the significance of the correlation between the researchers' *h*-index in Scopus and the average RG Score will be judged. The null hypothesis indicates the lack of correlation and the alternative hypothesis indicates the presence of a correlation. The Pearson correlation coefficient indicates the degree to which two variables are related. The closer to 1, the stronger the correlation between variables and vice versa.

**Table 8. Correlation coefficient results between the h-index in Scopus and the RG Score**

Universities	Correlation Coefficient	Significance level
Hamadan	0.726	<b>0.000</b>
Kermanshah	0.496	<b>0.000</b>
Kurdistan	0.409	<b>0.000</b>
Ilam	0.632	<b>0.000</b>

According to Table 8, the correlation is strong and significant in all universities, so it can be concluded that average Scopus *h*-index and average RG Score have a significant correlation with each other.

#### G) Investigating the Relationship between Researcher Citation in Scopus and ResearchGate

Pearson correlation coefficient was used to investigate this relationship.

**Table 9. Correlation Coefficient result between citations in Scopus and ResearchGate**

Universities	Correlation Coefficient	Significance level
Hamadan	0.924	<b>0.000</b>
Kermanshah	0.635	<b>0.000</b>
Kurdistan	0.532	<b>0.000</b>
Ilam	0.627	<b>0.000</b>

The findings in Table 9 show that in all universities there is a strong correlation between citations in Scopus and citations on ResearchGate, so it can be concluded that citations in Scopus and citations on ResearchGate are significantly correlated.

## H) Investigating the Relationship between the Number of Researcher's documents in Scopus and ResearchGate

**Table 10. The Correlation coefficient of the number of researchers' documents from different groups in Scopus and ResearchGate**

Universities	Correlation Coefficient	Significance level
Hamadan	0.184	<b>0.000</b>
Kermanshah	0.277	<b>0.000</b>
Kurdistan	0.151	<b>0.000</b>
Ilam	0.135	<b>0.000</b>

According to Table 10, there is a weak correlation between the number of documents in Scopus and ResearchGate in all universities, so it can be concluded that the number of documents in the two databases are significantly correlated. That is, there is a relationship between the number of researchers' documents at ResearchGate and Scopus, and the researchers who have a large number of documents indexed in Scopus have also shared many documents on ResearchGate.

### Discussion and conclusion

Man is a social being, and because of this feature, seeks to expand his circle of activities by being present in society and interacting with others. It cannot be imagined that a solitary person can operate alone, which is why he has historically used all communication tools to interact with other humans. Scientific communication is also one of the channels of social communication in which researchers and scientists in different fields of science, after producing scientific works, transfer it to other researchers.

It has been 10 years since the creation of ResearchGate, but Iranian researchers still do not fully utilize the educational and research capabilities of this network. The results of this study show that among the researchers of the universities surveyed, 47 percent are the researchers who are members of ResearchGate.

Analysis of data collected from Scopus concerning to the researchers of medical universities of Western provinces of Iran show that, based on the number of documents, Kurdistan University of Medical Sciences (mean = 14.93), Hamadan (mean = 14), Kermanshah (mean = 13.20) and Ilam university of Medical Sciences (mean = 10.16) had the highest and the lowest mean, respectively. Based on the *h*-index, Hamadan University of Medical Sciences with the average of 4 had the highest *h*-index and Kurdistan University of Medical Sciences with the average of 2.53 had the lowest *h*-index. Based on the citation count, Hamadan University of Medical Sciences (94.42) had the highest and Kurdistan University of Medical Sciences (48.89) had the lowest citation count. On ResearchGate based on publication field, Ilam University of Medical Sciences has the highest average score (38.33). Based on the number of visits and citation count, Kermanshah University had the highest score of 4182.87 and 182.59, respectively.

Based on the RG Score, Kurdistan University had the highest score (28.49). Kermanshah University had the highest score among other universities in terms of followers and followings indicators. Kermanshah University had the highest average score (5.18) with respect to *h-index*. The order of the researchers' presence on ResearchGate based on altmetric index was as follows: Hamadan University was in the first rank (mean = 383.20), Kermanshah University was in the second rank (mean = 277.67), Kurdistan University was in the third rank (mean = 259.54) and Ilam University was in the fourth rank (mean = 237.71).

Regarding the significance level of *h-index* and visit items, there was no difference between the two items in the universities but there was a significant difference between the other items. Correlation is strong and significant in all universities, so it can be concluded that *h-index* in Scopus and mean RG score on ResearchGate are significantly correlated with each other. In all universities there is a strong correlation between citations in Scopus and ResearchGate.

In all universities, there is a correlation between the number of researchers' documents in the ResearchGate and Scopus, and the researchers who have indexed the highest number of documents in Scopus had also a high number on ResearchGate. By increasing the number of documents available on ResearchGate, the likelihood of citing articles will increase in Scopus and, consequently, the *h-index* will increase. Given the limitations of submitting articles to scientific social networks such as ResearchGate, researchers should first consider obtaining permission from the journals in which their articles are indexed and then they can publish the article and research data.

The present study is one of the first studies to compare the scientific productions in Scopus and ResearchGate. Given that the concepts and indicators of altmetric are at the forefront, researchers has shown that altmetric indicators can be used as a complement to scientometrics indicators to evaluate the impact of scientific productions and researchers' performance of country. Future research can compare the results of this study with that of other altmetric data providers, and compare the levels of researchers' presence in other Scientific Social Networks.

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