Research Performances of Organization of Islamic Conference (OIC) Members

Maryam Khoubnasabjafari[1], Eliza Sadeghifar[2], Majid Khalili[3], Khalil Ansarin[1], Abolghasem Jouyban[4*]

[1]*Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*

[2]*Liver and Gastrointestinal Diseases Research Center and Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran*

[3]*Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*

[4]*Drug Applied Research Center and Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran*

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ABSTRACT

Introduction: Scientometric analysis of academic institutions provides useful information for policy makers, international and national organizations to invest in the research fields of the institutions to gain more outputs with less cost. The objectives of this work were to report a scientometric analysis of Islamic states considering a number of indicators. *Methods:* The number of articles and patents published by members of organization of Islamic conference were extracted from Scopus[TM] along with the top journals, authors, document type, universities, language of the publications and subjects. *Results:* The analyses of data revealed that Turkey is the leading country followed by Iran, Egypt, Malaysia and Nigeria when total numbers of indexed articles in Scopus[TM] are considered. When the articles of 2006-2010 are considered the ranks are Turkey, Iran, Malaysia, Egypt and Pakistan. *Conclusion*: the increased pattern was observed for scientific performances of OIC members however, more investments are required to fill the gap between OIC members and the leading countries.

Introduction

Inquiry and search for knowledge have been recommended from Quranic sentences as "Say: Are those who know and those who do not know alike? Only the men of understanding are mindful" (Holy Quran, 39: 9). Although Muslims had very long history on exploration of scientific facts and employing them to solve the problems associated with their real life during the medieval centuries, small number of research was conducted/published by Muslim researchers between 15th and 19th centuries (El-Rauayheb 2006) and they showed up a declined pattern during last centuries when the scientific renaissance and industrial revolution happened in the Western societies with a great impact on the economic growth, life style, communications, environmental changes etc. Publication date of the first journal backs to 1665 in France and the first one in the Islamic countries backs to 1827 in Egypt, followed by Turkey in 1830 and Iran in 1837 (Azizi *et al* 2009). The mentioned publications were not peer reviewed and the history of peer review in the world backs to 1752 (Opthof *et al* 2002). Similar gap of the first journal publications in the Western and Islamic societies exists in the quantity and quality of the publications from these societies. The religious initiations and the need to provide higher levels of science and technology encourage Muslim scientists to increase their contributions in scientific publications at international levels. Research projects could be classified as basic and applied projects (Duncan 1951). The basic projects aimed to answer a scientific question and to broaden the knowledge and its outcomes may not appear for many years, whereas in an applied project, the researchers look for a practical solution to an existing problem. The process of a productive research includes the steps of input, activity, output and outcomes. Complete and comprehensive infrastructure, well-trained researchers, programmed research management system; enough budgets and a justified distribution system are required to produce qualified research outputs and outcomes. At least some of these requirements do not exist in most of organization of Islamic conference (OIC) members. In addition, cultural, political and security issues within these societies are other affecting parameters on the research performance (Rizvi 2005). The recent status of research publications of a number of OIC members were

*Corresponding author: Abolghasem Jouyban (PhD), Tel.: +98 (411) 3379323, Fax: +98 (411) 3363231, E-mail**:** ajouyban@hotmail.com

investigated in the last couple of years (Yurtsever and Gulgoz 1999, Mehrdad *et al* 2004, Gokceoglu *et al* 2008, Sotudeh 2010, Fakhree and Jouyban 2011).

Scientometrics has become an important field of study in recent decades (Torres-Salinas *et al* 2008, Abramo *et al* 2009) and it includes quantitative and/or qualitative analysis of the scientific products. The number of published articles is one of the most important parameters of evaluation of the research performance of a researcher, a department, a university and even a country. This criterion could also be considered as a measure of development in a country, since there is a close relationship between scientific performance and the quality of industrial products and/or social services within a society. The research and development departments play crucial roles in an industrial company or academia. The outputs of a research project could be a scientific paper published in a journal and/or a patent registered in a patent office. In addition to this quantitative tool to evaluate the research performance, citations to the published papers and/or commercialization of a patent could be possibly considered as qualitative tools to assess the research performance. It is obvious that there are some other qualitative tools such as impact factor of the journal, source normalized impact per paper (SNIP), SCImago journal rank (SJR), etc. When evaluation criteria focus on quantitative measures, the researchers are interested to increase the number of publications, as it is evident from Moed findings in UK where the number of publications has been used as evaluation tool in 1992, the number of papers from British authors was increased. The criterion was changed to the number of citations in 1996, and the scholars gradually intended to publish articles with a high citation impact (Moed 2007). It should be added that there is no general agreement on the evaluation of the research performance and the indicators used for this purpose and it is not in the scope of the present work to deal with this subject. Patel *et al* (2011) reviewed advantages and disadvantages of various indicators. The discussed indicators in their review were: 1) number of publications, 2) number of citations, 3) impact factor, 4) H-index, 5) research funding, 6) degree of co-authorship, 7) GDP and population size, and 8) uncommon indicators (number of conference presentations, number of patents, number of doctoral students, etc.).

The resulted research evaluation data can be used as a tool for ranking (Alewell 1990, Docampo 2011), awarding, budgeting, and defining research priorities, which might be helpful in science-related decision-makings. The data used in this respect, should be as correct as possible. Different methods are available for data gathering which are most based on bibliometric approaches. The aims of this work are to evaluate the recent status of publications of Islamic countries and compare the data with that of European countries. The main objectives of this study were to answer:

- *How many publications (papers and patents) were produced by the authors of OIC and EU members over a lifetime and during 2006-2010?*
- *What are the relative frequencies of the lifetime publications of OIC and EU members?*
- *What are the contributions per capita of OIC members?*
- *Who are the top authors of OIC members?*
- *What is the list of journals publishing most of OIC members' articles?*
- *What is the list of top universities of OIC members?*
- *What are the relative frequencies of publications of OIC members?*
- *What are the most common subjects and document types of articles of OIC members*

Materials and methods

Total numbers of articles indexed in Scopus[TM] published by the researchers of each OIC state were collected by searching the names of the countries in the affiliation section of the Scopus[TM]. The numbers of patents were gathered using similar method. The data was copied and pasted into an Excel file and then saved as ASCII files. After deleting inappropriate characters, the files imported to SPSS environment and the classifications among gathered data were carried out using SPSS 11.5 software. The required graphs were drawn using Excel 2003. The Scopus[TM] database was chosen since it was the only available and comprehensive database accessible for the authors. The summary results of these searches were used to compare the productivity of the researchers of the OIC members. The published documents from 2006 to 2010 were also extracted to assess the research performance during the last five years. We considered the time period of five years since assessing research performance over a 1-5 year period is more common in the literature (as examples see Ellwein *et al* 1989, Kaplan *et al* 1992). To further investigate, top five items of top five countries were extracted and analyzed. In order to compare the results of OIC members, the data of European Union (EU) countries was also collected. The data of this work were collected from 24th December 2010 to 10th January 2011. The impact factors of year 2010 were used in this study. Also, data related to populations were taken from www.who.int.

Results

Numbers of publications of OIC and EU members

Table 1 lists the numbers of articles published by the researchers of the OIC members during last five years, the total number of lifetime articles and patents indexed in Scopus[TM], the percent of contributions of OIC members and their populations.

Table 1. Total number of articles published by researchers of OIC members, percent of contribution, number of articles published in the last five years, total number of patents indexed in Scopus™ and the population

Country	Total number of articles	Contribution (%) of total papers	2010	2009	2008	2007	2006	Patents	Population[a]
Afghanistan	437	0.05	79	51	41	29	37	2	26088000
Albania	1104	0.11	167	108	92	77	68	41	3172000
Algeria	19205	1.99	2348	2668	2275	1789	1564	152	33351000
Azerbaijan	6868	0.71	692	662	592	536	388	95	8406000
Bahrain	3439	0.36	233	297	268	265	267	72	739000
Bangladesh	16672	1.73	1534	1733	1597	1433	1053	70	155991000
Benin	5981	0.62	459	625	465	515	399	47	8760000
Brunei-Darussalam	1025	0.11	103	108	100	87	66	63	382000
Burkina-Faso/Upper Volta	43	0.00	1	0	0	0	0	34	14359000
Cameroon	6978	0.72	681	652	615	588	567	84	18175000
Chad	470	0.05	24	45	32	28	41	1451	10468000
Comoros	53	0.01	6	2	2	5	2	4	818000
Cote D'Ivoir	2	0.00	1	0	0	0	0	0	18914000
Djibouti	155	0.02	15	16	7	11	8	2	819000
Egypt	93829	9.72	7897	7750	6213	5505	4951	1360	74166000
Gabon	1646	0.17	109	120	111	97	118	36	1311000
Gambia	1829	0.19	115	119	121	104	116	28	1663000
Guinea	288	0.03	27	25	23	32	20	221	9181000
Guinea-Bissau	3970	0.41	165	175	189	192	154	2	1646000
Guyana	468	0.05	27	25	23	32	27	14	739000
Indonesia	15889	1.65	1630	1686	1264	1128	1052	994	228864000
Iran	124462	12.92	23896	22379	18665	14422	10845	611	70270000
Iraq	7230	0.75	519	523	425	320	302	54	28506000
Jordan	20340	2.11	2075	1971	1876	1647	1422	6192	5729000
Kazakhstan	4945	0.51	329	380	329	328	311	241	15314000
Kuwait	16186	1.68	924	1097	1094	965	882	343	2779000
Kyrgyz	345	0.04	29	26	40	31	38	14	5259000
Lebanon	22801	2.36	2030	2063	1894	1799	1674	9247	4055000
Libya	2768	0.29	341	301	202	149	129	12	6039000
Malaysia	61541	6.38	10868	10351	7286	4802	4048	6393	26114000
Maldives	95	0.01	8	7	5	13	8	0	300000
Mali	1794	0.19	160	157	142	139	132	126	11968000
Mauritania	301	0.03	19	20	23	21	26	9	3044000
Morocco	23094	2.39	1946	2039	1780	1568	1466	511	30853000
Mozambique	1324	0.14	143	142	131	106	102	2	20971000
Niger	1831	0.19	223	215	161	103	92	129	13737000
Nigeria	51894	5.38	3809	4415	3641	3455	2974	126	144720000
Oman	6582	0.68	712	694	593	588	516	129	2546000
Pakistan	44859	4.65	6143	5771	4902	3918	3284	287	160943000
Palestine	2264	0.23	270	286	242	236	177	788	NA[*]
Qatar	4240	0.44	602	603	500	427	298	88	821000
Saudi Arabia	51078	5.29	5318	3938	3035	2651	2415	1803	24175000
Senegal	6311	0.65	366	368	366	335	286	45	12072000
Sierra Leone	659	0.07	38	37	23	19	15	52	5743000
Somalia	210	0.02	13	3	10	3	8	21	8445000
Sudan	5291	0.55	430	413	305	271	202	56	37707000
Suriname	253	0.03	11	13	20	13	10	9	455000
Syria	3322	0.34	368	281	335	243	215	52	19408000
Tajikistan	866	0.09	63	45	57	56	45	12	6640000
Togo	1230	0.13	87	72	84	74	69	1037	6410000
Tunisia	29852	3.09	4109	3988	3621	2786	2348	279	10215000
Turkey	256342	26.56	27975	28109	24593	23565	21674	5144	73922000
Turkmenistan	214	0.02	16	8	5	8	10	6	4899000
Uganda	7097	0.74	814	711	581	560	462	25	29899000
United Arab Emirates	14046	1.46	1762	1691	1400	1251	1157	843	4248000
Uzbekistan	7604	0.79	502	503	430	496	418	97	26981000
Yemen	1367	0.14	197	167	120	93	93	9	21732000
Sum	964989	100.00	113428	110654	92946	79914	69051	39564	1464931000

* Not Available

Turkey with the total number of 256342 and contribution percent of 26.56 is the leading country followed by Iran (124462 and 12.92 %), Egypt (93829 and 9.72 %), Malaysia (61541 and 6.39 %) and Nigeria (51894 and 5.39 %). The contribution of these five states is more than 50 % of the total contributions from Muslim states in the science production process. The raising rates of the number of articles of these five leading states are shown in Figure 1 in which the highest growth rate was observed for Iran and the lowest rate among these five states belonged to Nigeria. As shown in the figure, Malaysia passed Egypt in 2007 and it is expected that the number of articles published by Iranian researchers will pass Turkish articles in 2012.
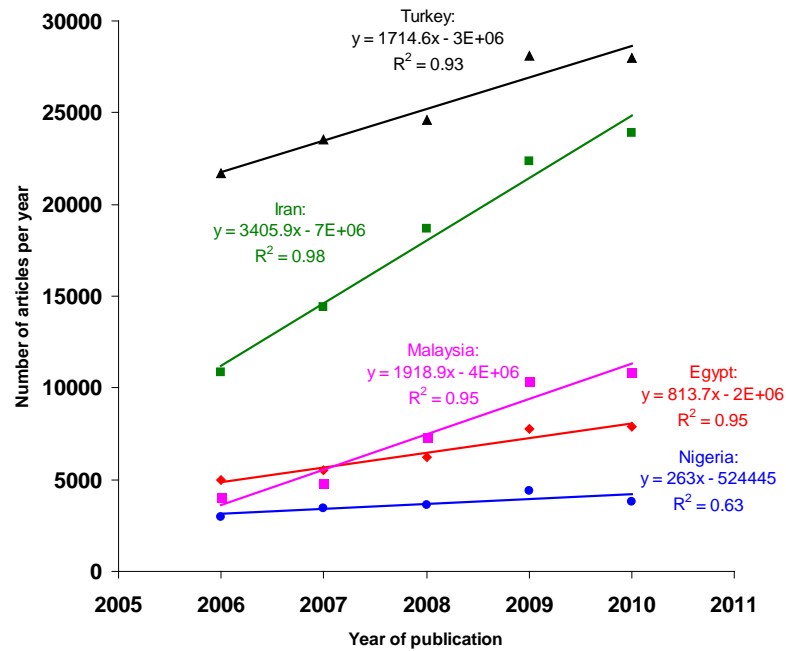
Fig. 1. The growth rate of five leading states among OIC members.

Concerning the number of indexed patents, Lebanon is the leading country with 9247 patents, followed by Malaysia (6393), Jordan (6193), Turkey (5144) and Saudi Arabia (1803). When the numbers of papers and patents were normalized concerning the populations, the ranks of the countries were changed. As shown in Figure 2, for the papers, Kuwait is the leading country and Jordan is the 5th rank of OIC states. Figure 3 shows the top five patent publishers of OIC members in which Lebanon and Brunei-Darussalam are the 1st and 5th ranks, respectively. When the sum of articles published from 2006 to 2010 is considered, the ranks are as Turkey (N=125916), Iran (90207), Malaysia (37355), Egypt (32316), and Pakistan (24018).
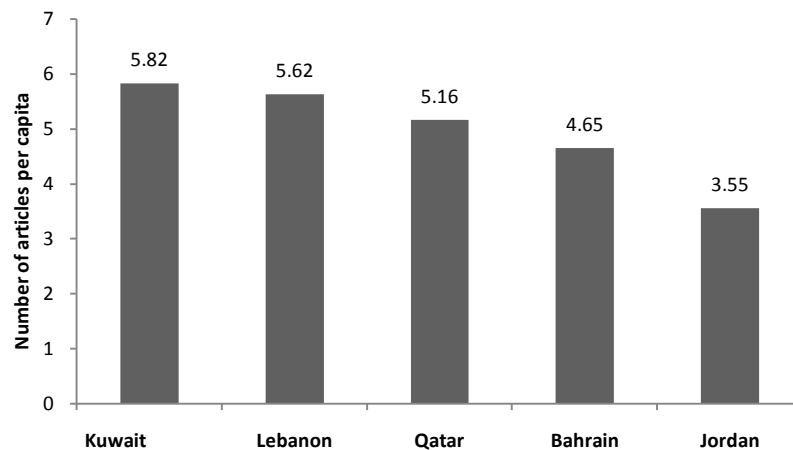

Fig. 2. The top five OIC states publishing the highest total number of articles per capita.
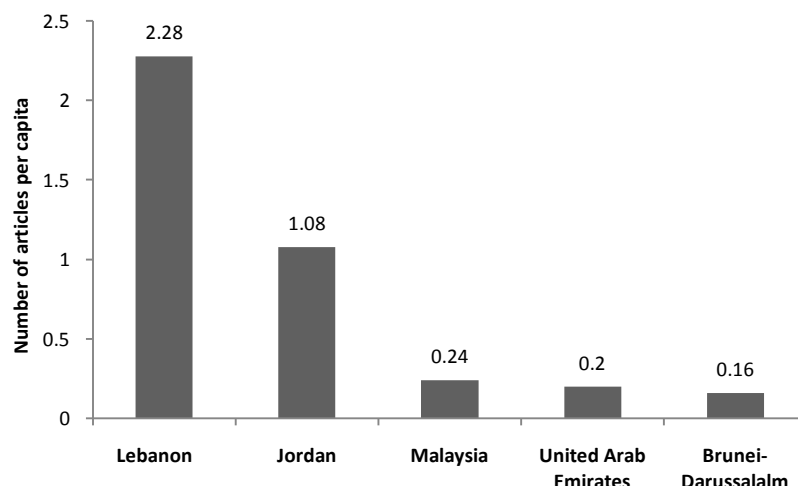
Fig. 3. The top five OIC states publishing the highest total number of patents per capita.

In another analysis, the total number of articles and patents published by the authors of the Arab League countries (N=22) was compared with that of non-members (N=35). The number of articles and patents of Arabs were 327653 and 22026, and those of non-Arabs were 637336 and 17538. When these numbers were converted to the percent of contributions, the figures were 33.95 % (articles) and 55.67 % (patents) for Arab authors and 66.05 % (articles) and 44.33 % (patents) for non-Arab authors. The number of published articles per capita for Arab authors was 0.001023 and for non-Arabs was 0.000557. These figures for two leading OIC members, i.e. Turkey and Iran, were 0.003468 and 0.001771. These findings are in agreement with those of Benamer and Bakoush (2009).

Table 2 listed the total number of articles, the published articles between 2006 and 2010, number of registered patents and the population of the EU countries. UK with the total article number of 2512723 and 20.76 % of contribution is the leading country among EU members followed by Germany, France, Italy and others. The total number of publications of EU members was 12104372 and the publication per capita was 0.024616. The corresponding figure for OIC members was 0.000659.

Table 2. The Total number of articles published by researchers of OIC members, percent of contribution, number of articles published in the last five years, total number of patents indexed in Scopus[TM] and the population

Country	Total number of articles	Contribution (%) of total papers	2010	2009	2008	2007	2006	Patents	Population[a]
Austria	265115	2.19	16517	15537	14850	13916	12846	70881	8327000
Belgium	355213	2.93	23210	22474	21174	19838	18723	84488	10430000
Bulgaria	65552	0.54	2943	3395	3122	3312	2577	1943	7693000
Cyprus	8165	0.07	1272	1262	939	772	655	1584	846000
Czech Republic	158299	1.31	13156	12205	11767	10631	10329	5293	10189000
Denmark	256365	2.12	16436	15365	13449	12907	12360	56857	5430000
Estonia	15751	0.13	1731	1532	1459	1381	1151	773	1340000
Finland	228453	1.89	13549	13685	13136	12817	12116	80302	5261000
France	1629213	13.46	91551	89725	84030	78917	75633	232319	61330000
Germany	2328869	19.24	126911	118879	109170	105098	104445	1116970	82641000
Greece	177280	1.46	15208	15737	14894	14078	13244	1998	11123000
Hungary	156242	1.29	7570	7523	7454	7131	7062	11012	10058000
Ireland	115721	0.96	10710	9990	8861	8134	7237	344402	4221000
Italy	1200895	9.92	72187	71877	67767	64964	60855	87192	58779000
Latvia	9806	0.08	680	698	696	525	448	643	2289000
Lithuania	19855	0.16	1965	2216	2207	1903	1870	566	3408000
Luxembourg	5446	0.04	889	778	595	455	390	10569	461000
Malta	2463	0.02	297	286	277	168	143	885	405000
Netherlands	675083	5.58	43434	40977	37096	35421	34596	233860	16379000
Poland	388387	3.21	24475	24142	23227	21774	23007	6458	38140000
Portugal	115032	0.95	13021	12188	11277	9417	9008	1517	10579000
Romania	85924	0.71	8367	9445	7416	5755	4156	1477	21532000
Slovakia	49394	0.41	3854	3859	4027	3426	3331	375	5388000
Slovenia	41654	0.34	3843	3998	3801	3462	3020	2813	2001000
Spain	742009	6.13	62903	60470	54660	50823	48226	44791	43887000
Sweden	495463	4.09	26646	25295	23961	23918	22927	162853	9078000
United Kingdom	2512723	20.76	130467	129231	123571	121581	116738	538958	60512000
Sum	12104372	100.00	733792	712769	664883	632524	607093	3101779	491727000

Top authors of OIC members

List of top 25 authors of OIC members are given in Table 3 along with their total number of publications (as a quantitative measure) and H-indices (as a qualitative measure). These data were extracted for five top authors of each OIC country and there are some authors with more publications from countries such as Turkey or Iran, however we considered just top five authors of the countries in this work.

To compare the number of publications and H-indices of the selected top authors from OIC members, their mean ± SD values were illustrated in Figures 4 and 5. The highest mean of publications among top 25 authors belongs to Malaysian authors as shown in Figure 4. Prof. H.K. Fun has published more than 1600 papers which is more than the sum of publications of 10 members of OIC states, i.e. Burkina-Faso, Comoros, Cote d'Ivoir, Djibouti, Guinea-Bissau, Maldives, Mauritania, Somalia, Suriname and Turkmenistan. The second mean value of the number of publications belongs to Turkey, followed by Iran, Saudi Arabia, Egypt, Pakistan and Lebanon. Concerning the qualitative measure of research performance of the top 25 authors, Iranian authors possess the highest H-index (32.2), followed by authors from

Turkey, Pakistan, Malaysia, Saudi Arabia, Lebanon and Egypt (see Figure 5).

Table 3. Details of top 25 authors of OIC members, and their total number of publications and H-indices

|	Author	Country	N	H-index
1	Fun, H.K.	Malaysia	1677	29
2	Ng, S.W.	Malaysia	1485	18
3	Buyukgungor, O.	Turkey	623	17
4	Heravi, M.M.	Iran	467	27
5	Shafik, A.	Egypt	416	23
6	Shamsipur, M.	Iran	416	41
7	Haberal, M.	Turkey	413	17
8	Dehghan, M.	Iran	358	25
9	Yilbas, B.S.	Saudi Arabia	346	22
10	Aboul-Enein, H.Y.	Saudi Arabia	335	23
11	Ganjali, M.R.	Iran	330	43
12	Baser, K.H.C.	Turkey	328	24
13	Demirbas, A.	Turkey	328	37
14	Hayat, T.	Pakistan	325	33
15	Yavari, I.	Iran	316	25
16	Choudhary, M.I.	Pakistan	302	21
17	Yagci, Y.	Turkey	295	27
18	Chantrapromma, S.	Malaysia	294	17
19	Ghoneim, M.A.	Egypt	245	28
20	Ahmad, V.U.	Pakistan	238	16
21	Morsy, T.A.	Egypt	232	9
22	Ali, S.	Pakistan	231	18
23	Abuelma'atti, M.T.	Saudi Arabia	230	18
24	Bhutta, Z.A.	Pakistan	223	34
25	Baraka, A.	Lebanon	217	20
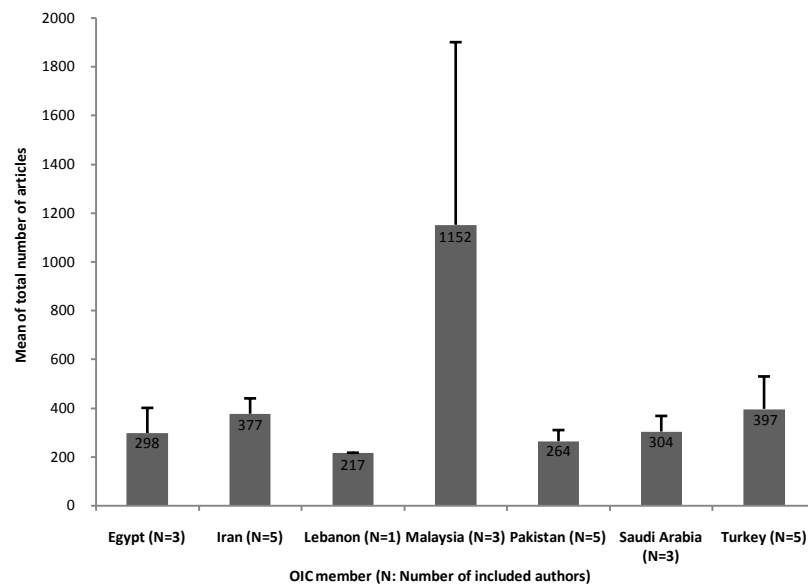
Fig. 4. The mean ± SD of the number of published articles by top 25 authors of OIC members.
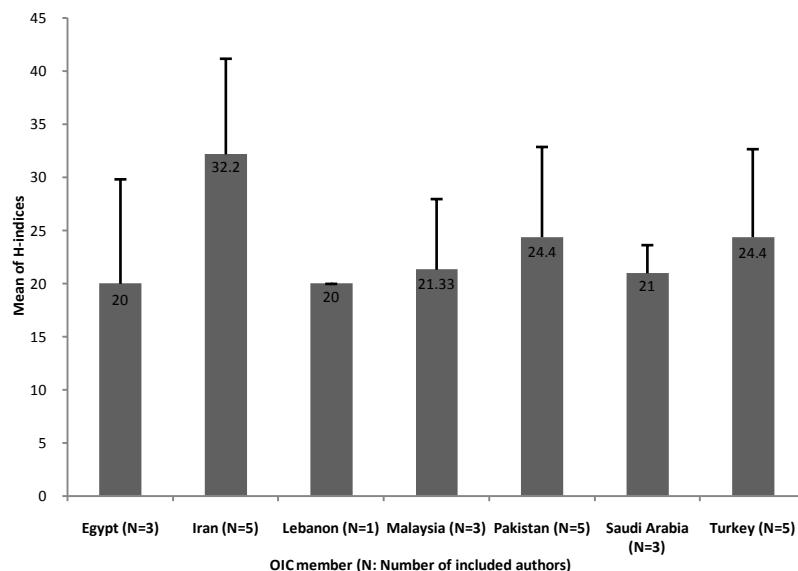
Fig. 5. The mean ± SD of H-indices of top 25 authors of OIC members.

Top journals publishing OIC members' articles

The collected data of top 5 journals for each country was analyzed and sum of the articles published in these journals along with the impact factors of the journals were listed in Table 4.

"Saudi Medical Journal" with the impact factor of 0.510 was the leading journal publishing more than 3783 papers by authors of OIC members. "Transactions of the Royal Society of Tropical Medicine and Hygiene" was the leading journal among top 25 journals concerning the qualitative measure with impact factor of 2.553. Considerable number of journals (N=11) have no impact factor. Table 5 listed details of top five journals publishing articles from top five countries of OIC in which "Applied Mathematics and Computation" is the most qualified journal from impact factor point of view followed by "Journal of Applied Polymer Science" and "Archive of Iranian Medicine". In addition to these journals, the number of publications in "Nature" is one of the indicators of university ranking systems (Docampo 2011). To provide brief information, the number of articles of the top five OIC countries were extracted and listed in the last column of Table 5. Interestingly, Nigeria with 191 articles is the leading country among

OIC members followed by Egypt, Malaysia, Turkey and Iran.

Table 4. Names of top 25 journals, the number of articles published in these journals from OIC members and their available impact factors

	Journal	N	IF
1	Saudi Medical Journal	3783	0.510
2	Acta Crystallographica Section E Structure Reports Online	3724	0.411
3	Journal of the College of Physicians and Surgeons Pakistan	2603	NA
4	Journal of the Pakistan Medical Association	2398	NA
5	Medical Journal of Malaysia	2109	NA
6	Annals of Saudi Medicine	2085	0.550
7	Tunisie Medicale	1810	NA
8	Turkish Journal of Veterinary and Animal Sciences	1721	0.342
9	Pakistan Journal of Botany	1635	0.520
10	Journal of Applied Sciences	1626	NA
11	Journal of the Egyptian Society of Parasitology	1405	NA
12	Turkish Journal of Pediatrics	1388	0.333
13	African Journal of Medicine and Medical Sciences	1340	NA
14	African Journal of Biotechnology	1325	0.565
15	East African Medical Journal	1312	NA
16	Applied Mathematics and Computation	1242	1.124
17	Desalination	1212	2.034
18	Pakistan Journal of Biological Sciences	1191	NA
19	Turkish Journal of Medical Sciences	1170	0.163
20	Anadolu Kardiyoloji Dergisi	1156	0.378
21	Chemistry of Natural Compounds	1130	0.572
22	Transactions of the Royal Society of Tropical Medicine and Hygiene	1052	2.553
23	Turkish Journal of Gastroenterology	1026	0.484
24	Aip Conference Proceedings	960	NA
25	West African Journal of Medicine	958	NA

Table 5. List of top five journals publishing the articles of top five countries of OIC, the number of published articles (N), the available impact factor of journals (IF) and number of publications in Nature

Country	1st journal	2nd journal	3rd journal	4th journal	5th journal	Nature
Turkey	Turkish Journal of Veterinary and Animal Sciences (N=1721, IF=0.342)	Turkish Journal of Pediatrics (N=1388, IF=0.333)	Turkish Journal of Medical Sciences (N=1170, IF=0.163)	Anadolu Kardiyoloji Dergisi (N=1156, IF=0.378)	Turkish Journal of Gastroenterology (N=1026, IF=0.484)	61
Iran	Pakistan Journal of Biological Sciences (N=1191)	Journal of Applied Sciences (N=857)	Archives of Iranian Medicine (N=822, IF=0.874)	Asian Journal of Chemistry (N=773, IF=0.213)	Applied Mathematics and Computation (N=656, IF=1.124)	40
Egypt	Journal of the Egyptian Society of Parasitology (N=1405)	Journal of Applied Polymer Science (N=733, IF=1.203)	Pharmazie (N=724, IF=0.812)	AEJ Alexandria Engineering Journal (N=650)	Applied Mathematics and Computation (N=586, IF=1.124)	126
Malaysia	Acta Crystallographica Section E Structure Reports Online (N=2623, IF=0.411)	Medical Journal of Malaysia (N=2109)	Singapore Medical Journal (N=730)	Journal of Applied Sciences (N=630)	Aip Conference Proceedings (N=626)	86
Nigeria	African Journal of Medicine and Medical Sciences (N=1340)	African Journal of Biotechnology (N=1325, IF=0.565)	West African Journal of Medicine (N=882)	East African Medical Journal (N=825)	Tropical Doctor (N=485, IF=0.399)	191

Top universities of OIC members

Table 6 listed the details of top 25 universities of the Muslim world concerning the total number of published articles. "Hacettepe Universitesi" is the leading one followed by "University of Tehran" and others. The percent of contributions of these 25 universities varied between 0.54 and 1.67 and the total percent of contribution of these universities was 23.88 among published articles from all OIC members. The number of universities within 25 top universities from Turkey, Iran, Egypt, Malaysia, Saudi Arabia, Nigeria and Lebanon were 5, 5, 5, 4, 3, 2 and 1, respectively. The percent of contributions of these seven countries in publishing 230419 articles (of 25 top universities) were 26.80, 21.46, 18.36, 15.88, 9.53, 5.63 and 2.34 respectively.

Table 6. List of top 25 universities of OIC members

	Country	University	Total No. of articles	% of contribution	% of total contribution
1	Turkey	Hacettepe Üniversitesi	16082	6.98	1.67
2	Iran	University of Tehran	14253	6.19	1.48
3	Turkey	Orta Dogu Teknik Üniversitesi	13025	5.65	1.35
4	Malaysia	University of Malaya	12109	5.26	1.25
5	Turkey	Ankara Üniversitesi	11611	5.04	1.20
6	Egypt	Cairo University	10843	4.71	1.12
7	Turkey	Istanbul Teknik Üniversitesi	10800	4.69	1.12
8	Egypt	Ain Shams University	10405	4.52	1.08
9	Iran	Daneshgahe Azad Eslami	10384	4.51	1.08
10	Turkey	Istanbul Üniversitesi	10228	4.44	1.06
11	Egypt	National Research Center, Cairo	9672	4.20	1.00
12	Iran	Sharif University of Technology	9584	4.16	0.99
13	Malaysia	Universiti Sains Malaysia	9235	4.01	0.96
14	Saudi Arabia	King Fahd University of Petroleum and Minerals	9194	3.99	0.95
15	Malaysia	Universiti Putra Malaysia	8423	3.66	0.87
16	Iran	Tehran University of Medical Sciences	8005	3.47	0.83
17	Nigeria	University of Ibadan	7774	3.37	0.81
18	Saudi Arabia	King Saud University	7557	3.28	0.78
19	Iran	Daneshgahe Tarbiat Modares	7219	3.13	0.75
20	Malaysia	Universiti Kebangsaan Malaysia	6818	2.96	0.71
21	Egypt	Alexandria University	5749	2.50	0.60
22	Egypt	Assiut University	5636	2.45	0.58
23	Lebanon	American University of Beirut	5398	2.34	0.56
24	Saudi Arabia	King Faisal Specialist Hospital and Research Centre	5219	2.27	0.54
25	Nigeria	Obafemi Awolowo University	5196	2.26	0.54
			230419	100.00	23.88

Relative frequency of publications of OIC members

Concerning the frequencies of the languages of the published documents indexed in Scopus[TM], English language is the first ranked language (93.96 %) followed by French (2.77 %), Turkish (2.39 %), Russian (0.26 %), German (0.24 %), Arabic (0.13 %), Persian (0.09 %) and other languages (0.16 %). This pattern is slightly different from the global pattern of the ranks of Russian, German, French and Spanish languages as the 2nd to 5th rank as reported by Osareh and Wilson (2000). French language documents were published mainly by the researchers of the countries which were a part of French colonies in the past including Tunisia (with 8289 documents), Morocco (6084), Senegal (2879), Algeria (2178) and Cameron (1012). Mainly researchers from Turkey

published Turkish documents. Russian language publications were mainly from the ex-members of USSR including Azerbaijan (966), Uzbekistan (807), Kazakhstan (543), Tajikistan (97) and Turkmenistan (25). German language documents were published mainly by Arab countries and the top five countries publishing the highest numbers in German as the second rank language include Egypt (379), Indonesia (114), United Arab Emirates (33), Iraq (29) and Sudan (19). Arab and Iranian researchers mainly published Arabic and Persian languages documents. Careful review of the scientific documents from medieval centuries reveals that Arabic and Persian languages were the language of science on that era (El-Rouayheb 2006). However, now they are just used in very limited geographical areas. It should be noted that Arabic language was also used to report the scientific findings by non-Muslim scholars in the past (as examples see Leiser (1983) and Sarton (1927)). Further investigation using "Language search" of Scopus[TM], reveals that the numbers of journals published in Turkish, Persian and Arabic languages which were indexed in the Scopus[TM] are ~160, ~ 25 and ~ 50. This could be a main reason for the low number of articles indexed in the Scopus[TM] written in these languages. It seems that there is also a problem with the indexing system of the languages with the Scopus[TM] database, as "Tehran University Medical Journal", "Koomesh", "Iranian Journal of Endocrinology and Metabolism", "Pharmaceutical Sciences", "Journal of Babol University of Medical Sciences", "Iranian Journal of Obstetrics Gynecology and Infertility", "Iranian Journal of Pediatrics" and some others are publishing in Persian language however they were indexed as Arabic journals in the Scopus[TM].

Subjective and document type analyses of OIC members

Analysis of the published documents concerning the top five subjects for each state reveal that medicine is the first ranked subject for the majority of OIC states. Engineering is the second rank subject concerning the number of publications. Engineering was the first rank for Algeria and Iran. Physics and astronomy was the first rank subject of ex-members of USSR, i.e. Azerbaijan, Kazakhstan, Kyrgyz and Uzbekistan.

Document type analysis of the publications of OIC members showed that the majority of the publications were in the form of "Article" (80.78 %) followed by "Conference paper" (10.65 %), "Review" (3.38 %), "Letter" (3.37 %) and "Article in press" (1.73 %).

Discussion

The number of papers published by the authors of a country is one of the most important indices representing the national intention toward science and technology.

Research is the first step in the process of science-technology and production, and the higher number of publication could not be resulted in achieving high technology and better quality of the products and other factors could affect this process. The progresses made in the scientific publications of the OIC members are investigated in this report and the findings are in agreement with the comprehensive investigation on leading scientists and engineers of OIC in which the number of included scientists from Turkey, Pakistan, Iran, Egypt, Malaysia, Saudi Arabia and Morocco were 81, 62, 55, 45, 27, 22 and 18 respectively (Naim 2008). Findings of this study reveal that the number of publications increased with different patterns among OIC members. There is an increased pattern in the number of publications around the world and this is due to a number of parameters including:

- Increased number of the scientific periodicals around the world (Testa 2008)
- Facilitated communications, review and publication processes of the articles using Internet.
- Providing more comprehensive indexing databases and their efforts to index more and more periodicals.

This increased pattern has been observed for the authors of OIC members as well as EU members. The number of papers published by the authors of top 20 Muslim countries indexed in "Science Citation Index (SCI)" between 1990 and 1994 was compared (Anwar and Abu Bakar 1997). Although Scopus^{TM} covers more journals when compared with SCI, however the ranks of the countries in both databases could be compared. Figures 6 and 7 compared the percent of contribution of a number of OIC members among all Muslim countries collected from Anwar and Abu Bakar report (1997).
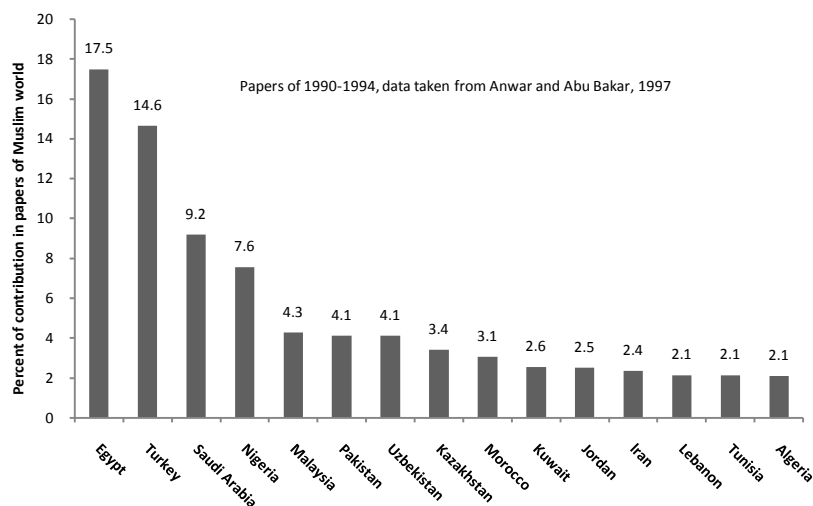

Fig. 6. Percent of contribution of a number of OIC members in the publications of OIC during 1990-1994.
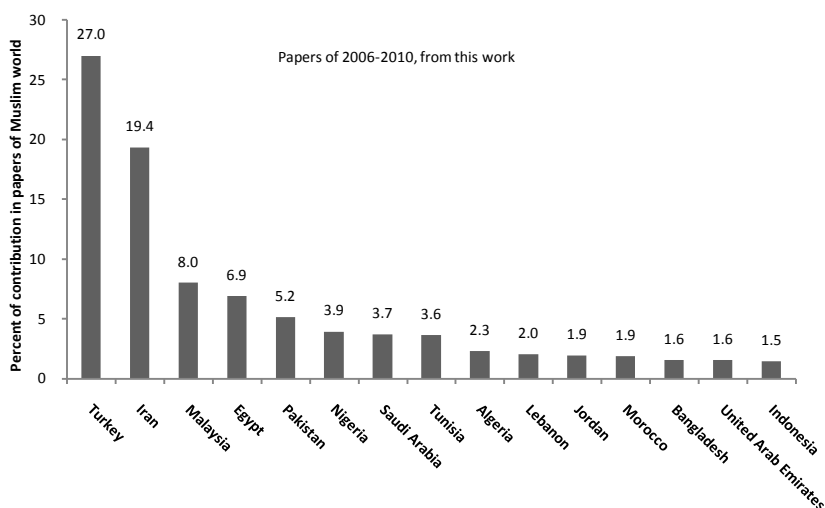

Fig. 7. Percent of contribution of a number of OIC members in the publications of OIC during 2006-2010.

Turkey was the leading country with nearly 12 percent increase in the contribution among publications which was the second rank in the previous study. The highest increase in the percent of contribution (17) was observed for Iran which jumped from the 12th rank to the 2nd position among OIC members. The highest decrease (-10.6) was shown for Egypt which dropped the position from the first rank to the fourth rank. These findings are in agreement with previous results (Moin *et al* 2005). Similar pattern was observed for the contribution of EU members for the number of articles published between 2006 and 2010 as shown in Figure 8. Concerning the increased number of articles of the authors of OIC and EU members, the increase rate of EU members is more than that of OIC members as shown in Figure 9. One of the possible reasons for this higher rate of EU members is publishing and indexing more scientific journals by European countries. According to Testa (2008), 700 new regional journals were added to Web of Science in which 364 journals were published by EU countries and 50 journals were published by the Middle East and African countries.
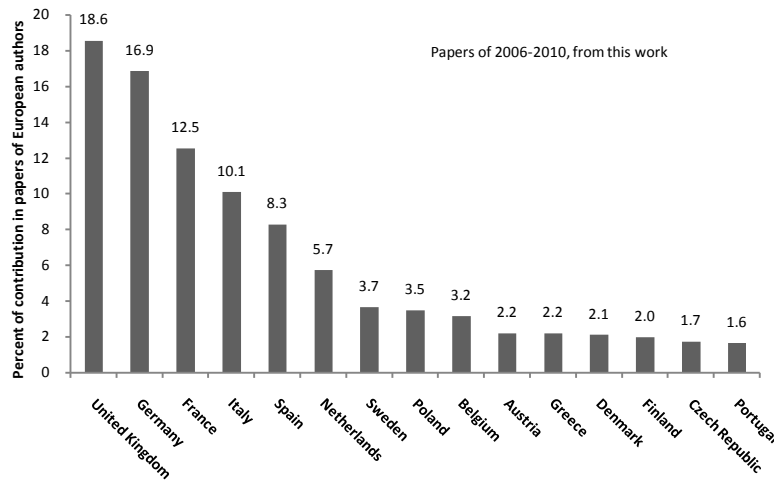

Fig. 8. Percent of contribution of a number of EU members in the publications of EU during 2006-2010.
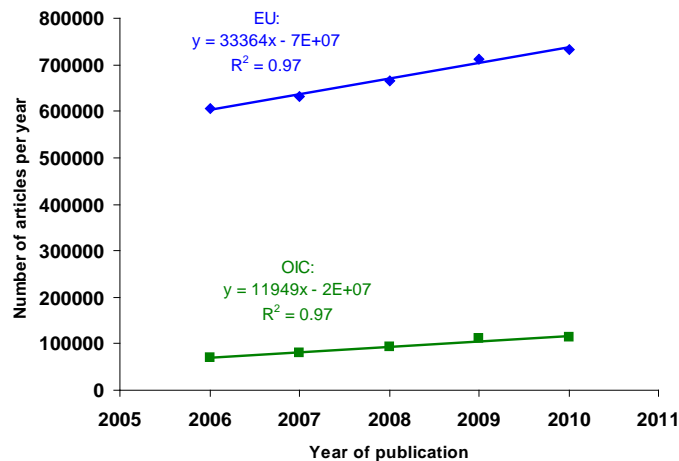

Fig. 9. The growth rates of publications of EU and OIC members between 2006 and 2010.

Some OIC members are more active in a discipline and could assist other members by training their researchers. The rate of cooperation between OIC members is very low when compared with the cooperation with non-OIC members. As an example, in a report, 582 joint papers published by Iranian and researchers from 47 other nations, the relative frequency with co-authors from USA, UK, Canada and Australia were 20.10%, 15.29%, 14.26% and 8.42%, respectively. The sum of the corresponding values for 7 OIC members was 4.12% (Moin *et al* 2005).

A number of possible reasons could be considered for lower contributions of OIC researchers including:

- Limited numbers of regional journals were indexed in databases like Web of Science or Scopus™. As an example the number of Iranian journals indexed in Web of Science in 2005 was three (Moin *et al* 2005) now increased to 45 (Magiran).

- Low investment in research as it is evident from very small percent of GDP spent in research (Malekzadeh *et al* 2002).

- Language quality of the manuscripts sent for review processes and its effect on the overall judgment of the reviewers. Weisinger and Bellorin (1999) reported higher rate of the accepted abstracts from the third world countries in comparison to the full articles. The authors claimed that this is because of the low English quality of the submissions.

- Brain drain from OIC members mainly to North America, Europe or Australia, because of inadequate working conditions and facilities in most of OIC countries (Rizvi 2005, de la Croix and Docquier 2011).

- Possible bias in the review process of the submissions (Primack *et al* 2009, Opthof *et al* 2002).

To improve the contributions of OIC members, the publishers of OIC members should try to index more publications in Scopus™ and other databases. This will increase their contributions in the knowledge production. Publishing the articles in bi-lingual journals could be another source to increase the contribution, since the articles published in Turkish, Persian or Arabic languages are only could be read by the native readers of these languages. When these articles are published in English language, they could cover more readers which will be resulted in more citations etc. The cooperation between OIC members could accelerate their development processes and improve the related indices and publishing peer review journals under supervision of OIC scientific committee is recommended to facilitate the process of scientific contribution from Islamic world. Providing English language editing services to the authors for assisting them to improve the quality of written style will increase the rate of acceptance and citation of the articles from OIC members, since all these countries are used English language as the second and even third or fourth language. Student and academic staff programs could facilitate the collaborations among OIC members.

Conclusion

As a conclusion, Muslims should keep in mind that "Verily God will not change the condition of men, till they change what is in themselves" (Holy Quran, 13:11). In recent years, a number of global issues such as "Talebanism", "Fight against terrorism", "Domestic conflicts", "Conflicts among OIC members", etc. are more influencing problems of the Muslim world which affect their research performance. In spite of media propaganda, majority of Muslims are trying to provide modern and developed societies to live in peace and justice with other religions and nations around the world.

Ethical issues

Not applicable in this research.

Conflict of interests

Authors declared no conflicts of interests.

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