

Medical Publications (2002-2009) of Islamic Countries; A Medline-Based Study Compared To Non-Islamic Countries

Esmail Habibi¹, Zohreh Mirhosseini²,
Mousa Majidi²

Abstract

Background: The number of scientific publication by a country is an important indication of its science generation and development. The aim of this study was to compare the publications in medical sciences of Islamic countries from 2002-2009 with those of a number of developed countries.

Methods: The PubMed and CIA World Fact Book were used to extract the number of publications and socioeconomic status of target countries, respectively. The number of publications, publications per million population, gross domestic product (GDP) per capita, population below poverty line (PBP) and type of publications of the countries were compared.

Results: The publications of Islamic countries increased from 6906 in 2002 to 21656 in 2009. There was a positive correlation between GDP per capita and publication per million. However, publication productivity did not decrease significantly with the increase of PBP. Turkey and Iran were top two among Islamic countries in terms of the number of publications and growth of the rate of scientific publication, respectively. Islamic countries do lag behind developed countries in terms of the number of publication and the rate of growth.

Conclusion: There is a wide gap between developed and Islamic countries and among Islamic countries themselves in terms of the number and the rate of growth of publication in medical sciences.

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Keywords • Publication • research type • gross domestic product

Introduction

Recent advances in technology, especially in the field of medicine, and massive scientific productivities in industrialized countries might not be the case in less developed countries or regions in which the pressure for patient care and community needs remains ill-satisfied by budget limitations.¹ The ability to judge a nation's scientific standing is vital for the governments, businesses and trusts, which make decision about scientific priorities and their funding.²

There are a number of ways to evaluate the scientific research productivities, but few are satisfactory.² The number of publications has not only been used to provide productivity

¹Faculty of Library & Information Science, Science and Research Branch,

²Faculty of Librarianship & Information Science,

North Tehran Branch, Islamic Azad University; Tehran, Iran.

Correspondence:

Esmail Habibi PhD Student, Science and Research Branch, Islamic Azad University, Tehran, Iran.

Tel: +98 21 77505934

Fax: +98 21 22250204

Email: ismaeilhabibi@gmail.com

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counts, but to assess research trends in certain disciplines.³ Since it is easy to obtain, the total or average (per capita) number of publications is a common and popular method to assess the research productivity.⁴ A number of studies indicate that there is a relationship between the citations and total publications. They also showed that the number of publications, the number of citations and peer ratings were interrelated.⁵ The academic members, who were prolific writers, were heavily cited, and their citations were positively correlated to peers' ratings.⁶

Funding is another important determinant of research productivity. There is a great deal of studies, which confirm that higher funding would result in higher productivity.³ Folger, Gordon and Salisbury found a positive relationship between the adequacy of the amounts of financial support for research and the publication productivity.^{7,8}

The extraordinary rise in the number of journals in the field of medical sciences, and ongoing pressure to publish scientific papers by academic members makes it important to determine the quality of scientific publications.⁹⁻¹³

The objective of present study was to use Medline database to investigate the medical publication productivity of Islamic countries. Moreover, it aimed at comparing the total number of publications of Islamic countries with those of nonIslamic developed countries with high publication productivity.

Materials and Method

Advanced Search utility of PubMed web site of the National Library of Medicine (www.ncbi.nlm.nih.gov/PubMed/medline.html) was used to find articles published in a period from January 1, 2002 to December 31, 2009 by authors from Islamic countries. The countries that were included in the study were selected from CIA World Fact Book (<https://www.cia.gov/library/publications/the-world-factbook/fields/2122.html>). Countries in which Muslims constituted more than 50% of their population were selected. Selected countries included Afghanistan, Albania, Algeria, Angola, Azerbaijan, Bahrain, Bangladesh, Bosnia Herzegovina, Brunei, Burkina Faso, Cameroon, Chad, Comoros, Djibouti, Egypt, United Arab Emirates, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Libya, Malaysia, Maldives, Mali, Mauritania, Mayotte, Morocco, New guinea, Niger, Oman, Pakistan, Qatar, Saudi Arabia, Senegal, Somalia, Sudan, Syria,

Tajikistan, Tanzania, Togo, Tunisia, Turkey, Turkmenistan, Uzbekistan, Western Sahara and Yemen. Some countries were searched by more than one keyword. For instance, Saudi Arabia was searched using Saudi Arabia, KSA or K.S.A, and United Arab Emirates was searched using United Arab Emirate, UAE or Emirates. A number of other countries including Australia, Brazil, Canada, Germany, China, India, Japan, Russia, South Africa, USA and UK, which had different religions and high publication productivity were also searched for the number of publications. The CIA World Fact Book was used to collect other required data such as population, gross domestic product (GDP) and percent of population below the poverty line (PBP) for the selected countries. In addition, the limit service of PubMed was used to narrow the search to a desirable result.

The number of publications was recorded in one-year strata starting from the first day of the year, and finally the sum of the publications between 1/1/2002 to 12/31/2009 was calculated. There were a number of problems with Medline searches. One problem was when the name of a country had been mentioned in the title, abstract or text, while the place of the authors and study was not that country. The second was that the name of some countries had similarity with other words, which could potentially affect the results of the search. For instance; the words Guinea, Guinea Bissau, New guinea and guinea pig (a laboratory animal) were somehow similar. Therefore, the list of publications for each country was rechecked manually to avoid such mistakes.

Every country was searched for the type of published articles in each year and total articles from 1/1/2002 to 31/12/2009. The types of articles were based on the PubMed released categories and included Editorials, Letters to the editors, Case Reports (report of rare cases in clinic), Review articles, Randomized Controlled Trials, Controlled Clinical Trials, Clinical Trials, Comparative Studies, Multicenter Studies (in which clinical trials were conducted in more than two centers) and *in vitro* research papers.

Every time "clinical trial limits" was used, the results consisted of either "clinical trial", "Randomized", "Multicenter Study" or "Controlled Clinical Trial", therefore, all results were counted as clinical trials but every type was searched separately (Randomized, Multicenter Study or Controlled Clinical Trial). In cases where an article could be categorized in more than one group, the article was counted for each group separately.

Statistical Analysis

The data were described or analyzed by descriptive and analytical statistics using Statistical Package for Social Sciences (SPSS version 14). The comparisons between countries were made using annual publications, total number and types of published articles per million of populations. The correlation between variables was examined using Spearman's correlation test.

Results

Publications

Of 55 Islamic countries, only 20 had more than 500 articles annually, and 23 had an annual average publication of more than 50. Among Islamic countries Turkey had the highest total (51,273 articles) and average (6,409.13) number of publications in medical sciences, and was far ahead of the second country, namely Iran with total (9,549) and average (1,193.63) publications. Iran was fol-

lowed by Egypt with a total of 6,721 and an average of 840.13, and Saudi Arabia with a total of 6,128 and an average of 766 publications (table 1). Iran was the first ranking Islamic country in terms of the rate of publication growth with an annual increase of 100 publications. The Publications in Iran increased 13.63 times, which was much higher than the rate of increase of the second (Pakistan; 4.25 times) and the third (Turkey; 3.45 times) Islamic countries. The high slope of publications per million of population for Iran during 8 years of the study confirmed that it had the most rapid growth of publication productivity among the Islamic countries (figure 1).

Because of the small number of publications in each Islamic country, the total number of publications of Islamic countries was compared with those of countries which had high research productivity like USA. Such a comparison revealed a large gap between Islamic and developed countries. The total number of

Table 1: The annual publications of Islamic and Non-Islamic countries from 2002 to 2009. Countries with publications less than 300 are not shown

Islamic Countries	Number of publications in each year								SUM
	2002	2003	2004	2005	2006	2007	2008	2009	
BAHRAIN	26	24	24	35	52	46	55	60	322
BANGLADESH	104	112	105	127	132	147	165	224	1116
BOSNIA&HERZEGOVINA	4	12	12	18	63	80	101	118	408
BURKINA FASO	26	35	51	47	36	38	46	48	327
CAMEROON	36	56	62	70	76	79	95	124	598
EGYPT	561	701	697	811	815	923	1011	1202	6721
EMIRATES	111	144	109	134	160	181	192	203	1234
ERITREA	35	34	32	56	55	55	63	36	366
ETHIOPIA	67	84	110	107	103	115	110	139	835
INDONESIA	101	82	101	97	97	110	150	132	870
IRAN	240	349	493	745	951	1378	2122	3271	9549
IRAQ	41	32	43	47	32	57	79	88	419
JORDAN	179	205	270	250	293	348	368	399	2312
KUWAIT	167	188	227	239	248	301	271	299	1940
LEBANON	354	416	364	447	494	556	649	604	3884
MALAYSIA	304	299	343	349	510	576	609	694	3684
MOROCCO	62	95	90	115	110	128	156	195	951
NIGERIA	423	491	610	575	676	799	889	1023	5486
OMAN	75	107	85	116	110	114	106	122	835
PAKISTAN	153	166	238	316	340	527	583	650	2973
QATAR	7	24	21	29	53	62	67	86	349
SAUDI	608	594	657	685	787	721	771	1305	6128
SENEGAL	97	88	93	104	72	128	92	97	771
SUDAN	29	41	46	58	64	64	65	76	443
TANZANIA	71	87	84	76	87	104	135	171	815
TUNISIA	59	88	80	161	191	255	342	475	1651
TURKEY	2721	3627	4913	6026	7272	8424	8908	9382	51273
Non-Islamic Countries									
AUSTRALIA	8343	9031	9427	10212	11173	12494	13947	15007	89634
BRAZIL	2969	3441	4269	4877	6344	7376	8786	9761	47823
CANADA	12978	13666	14303	15651	16435	18598	20365	22333	134329
GERMANY	20890	22521	25188	24151	24436	28168	29724	31660	206738
CHINA	6956	8978	11565	15414	19315	21088	23992	37384	144692
INDIA	4126	4888	5498	6381	6898	8560	9877	12000	58228
JAPAN	33709	33343	34075	34926	35530	37054	37251	38787	284675
RUSSIA	2541	2574	2735	3009	1974	1640	1537	1902	17912
SOUTH AFRICA	1060	1134	1136	1165	1235	1479	1591	1694	10494
USA	140713	144582	149525	158019	168547	179590	188363	194040	1323379
UK	28432	30308	31415	33169	35420	38405	40472	37930	275551

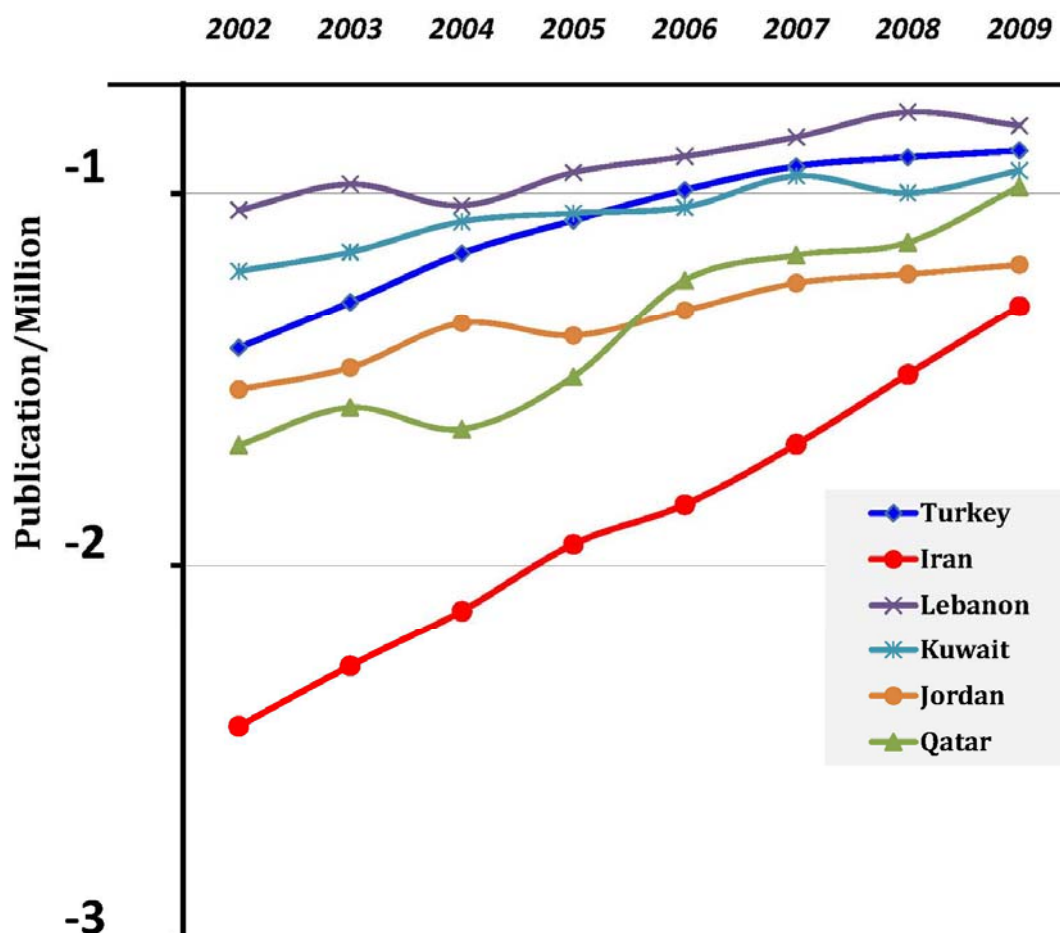


Figure 1: Annual number of publication per millions of population for Turkey, Iran, Lebanon, Kuwait, Jordan and Qatar from 2002-2009. The figure portrays the trend in publication for such countries. The values of Y-axis (Publications/Million) were showed in logarithmic scales (with Base 10, Min value = 0.001).

publication of Islamic countries (108,745) was more than those of South Africa, Russia, Brazil, India and Australia, but less than those of Canada, China, Germany, UK, Japan and USA (figure 2). Turkey with 47% of total publications of Islamic countries had more publications than South Africa, Russia and Brazil (figure 1, table 1).

Annual Publications and Trend of Scientific Productivity

The average annual publication of Islamic countries (13582.5) was higher than those of South Africa, Russia, Brazil, India and Australia, but less than those of Canada, China, Germany, UK, Japan and USA. The Turkey's average annual publication (6,409.13) was higher than those of South Africa, Russia and Brazil. However, Iran's annual average publication productivity was less than that of each of the developed countries. The total number of publications of Islamic countries increased from 6906 in 2002 to 21656 in 2009 showing an increase of 2107.14 annually. The growth of

the total number of publications for Islamic countries was highly affected by the publications of Turkey, which had an increase of 2721 in 2002 to 9382 in 2009 resulting in an average annual increase of 951.57 (table 2). The average annual publication of Iran was 433. The average annual publication of other Islamic countries was less than that of turkey (722.57). The average increase in the number of publications from one year to next in all Islamic countries was more than that for Russia (-91 per year), South Africa (91 per year), Brazil (970 per year), India (1125 per year), Australia (952 per year), Canada (1336 per year), Germany (1539 per year), UK (1357 per year), Japan (725 per year). Moreover, Turkey showed a higher trend than South Africa, Russia and Japan.

Publication and Population

The Islamic countries with a population of 1,948,757 million people had 108,745 publications from 1/112002 to 12/31/2009 resulting in

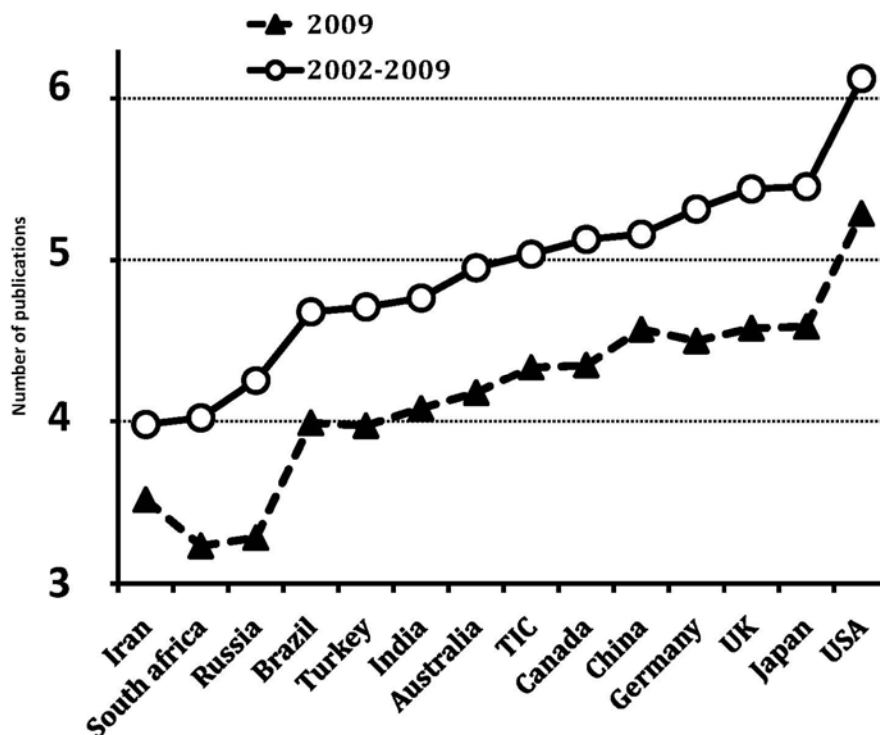


Figure 2: Total publications from 2002 to 2009 and 2009 for IRAN, Turkey and Total Islamic Countries (TIC), and a number of non-Islamic developed countries. The values are shown in logarithmic scale.

55.76 publications per million of population (pub/million). Comparison of the sum of publications for all countries per population of them at 2009 revealed that Lebanon with 978.09 pub/million was ranked first among Islamic countries, followed by Kuwait (747.30) and Turkey (713.19), Bahrain (448.47), Qatar (423.54) and Jordan (373.02). Iran with pub/million of 144.96 was ranked thirteenth among Islamic countries. Afghanistan had the lowest pub/million (0.89) among Islamic countries (table 2). Total publications per million of some Islamic countries including Lebanon, Kuwait, Bahrain, Turkey, Jordan, Qatar, Emirates and Oman were more than those of India, Brazil, South Africa, Russia, China (table 2).

The ranking of the annual pub/million of population through the period of the study was Lebanon>Turkey>Kuwait>Jordan & Qatar>Iran (figure 1). The increase of the annual pub/million of population was the highest for Iran during the 8 years of the study increasing from 0.003 pub/million in 2002 to 0.049 in 2009, leading to an increase of 16.33 times. However, the increase in such a variable was 1.6 for Lebanon, 4.3 for Turkey, 2.5 for Kuwait, 2.2 for Jordan and 4.76 for Qatar.

Publications and GDP

The average GDP per capita for Islamic

countries was 8,944.64\$, which ranging from 600\$ forGuinea Bissau to 87,600\$ for Qatar (table 2). To get rid of the missing data, the Islamic countries that had less than 50 publications in the study period (2002-2009) were dropped, and then the correlations between GDPs per capita and publication productivities in 2008 and 2009 were calculated. There was no correlation between GDPs per capita and the total number of publications of Islamic countries. However, there was positive linear correlations between GDPs per capita and publications per million of each Islamic countries (Spearman's rho, $P < 0.01$, Correlation Coefficient=0.539). The correlation indicates that the publication productivity increased slightly as the GDPs of Islamic countries increased in 2009 ($R^2=0.20$, figure 3). Turkey with pub/million to GDP per capita ratio of 4.27 ranked first followed by Nigeria (2.61), Egypt (1.34), Pakistan (1.24), Ethiopia (1.19) and Iran (0.82). However, Qatar with the highest GDP per capita among Islamic countries had a pub/million to GDP per capita ratio of 0.017 (table 2).

The total pub/million to GDP per capita ratios for Islamic countries was 12.16, which was less than those of India, China, USA and other developed countries. The USA had the highest (28.89) pub/million to the GDP per capita ratio.

Table 2: The number of publications from 2002-2009 (PUB total), population (in million), average of annual publications (AA), percent of population below poverty line (PBP%), gross domestic product (GDP) of Islamic and non Islamic countries.

COUNTRY	PUB (total)	POP (million)	PUB/M	AA	PBP (%)	GDP
BAHRAIN	322	718	448.47	40.25	*	33900
BANGLADESH	1116	153546	7.27	139.50	45.0	1400
BOSNIA & HERZEGOVINA	408	4590	88.89	51.00	25.0	6100
BURKINA FASO	327	18467	17.71	40.88	48.0	2200
CAMEROON	598	18467	32.38	74.75	48.0	2200
EGYPT	6721	81713	82.25	840.13	20.0	5000
EMIRATES	1234	4621	267.04	154.25	19.5	37000
ERITREA	366	5502	66.52	45.75	50.0	800
ETHIOPIA	835	82544	10.12	104.38	38.7	700
INDONESIA	870	237512	3.66	108.75	17.8	3600
IRAN	9549	65875	144.96	1193.63	18.0	11700
IRAQ	419	28221	14.85	52.38	*	3700
JORDAN	2312	6198	373.02	289.00	14.2	4700
KUWAIT	1940	2596	747.30	242.50	*	55900
LEBANON	3884	3971	978.09	485.50	28.0	10300
MALAYSIA	3684	25274	145.76	460.50	5.1	14500
MOROCCO	951	34343	27.69	118.88	15.0	3700
NIGERIA	5486	146255	37.51	685.75	70.0	2100
OMAN	835	3311	252.19	104.38	*	19000
PAKISTAN	2973	172800	17.20	371.63	24.0	2400
QATAR	349	824	423.54	43.63	*	87600
SAUDI	6128	28146	217.72	766.00	*	19800
SENEGAL	771	12853	57.96	93.13	54.0	1700
SUDAN	443	40218	10.52	52.88	40.0	1900
TANZANIA	815	40213	20.27	101.88	36.0	1300
TUNISIA	1651	10383	159.01	206.38	7.4	7400
TURKEY	51273	71892	713.19	6409.13	20.0	12000
TIC	108745	1948757	55.76	13582.5	35.3	8944.64
AUSTRALIA	89634	20434	4266.86	11204.25	*	37300
BRAZIL	47823	190010	243.57	5977.88	31.0	9500
CANADA	134329	33390	4044.59	16791.13	10.8	38600
GERMANY	206738	82400	2509.90	25842.25	11.0	34100
CHINA	144692	1321851	108.79	18086.50	8.0	5400
INDIA	58228	1129866	50.72	7278.50	25.0	2600
JAPAN	284675	127433	2236.46	35584.38	*	33500
RUSSIA	17912	141377	127.57	2239.00	15.8	14800
SOUTH AFRICA	10494	43997	235.46	1311.75	50.0	13300
USA	1323379	301139	4355.74	165422.38	12.0	45800
UK	275551	60776	4521.45	34443.88	14.0	35000

TIC: Total Islamic countries (the values for TIC are shown either as sum (underlined) or averages (not underlined) of relevant values for total Islamic countries. * indicates undetermined values. Countries with publications less than 300 were not showed.

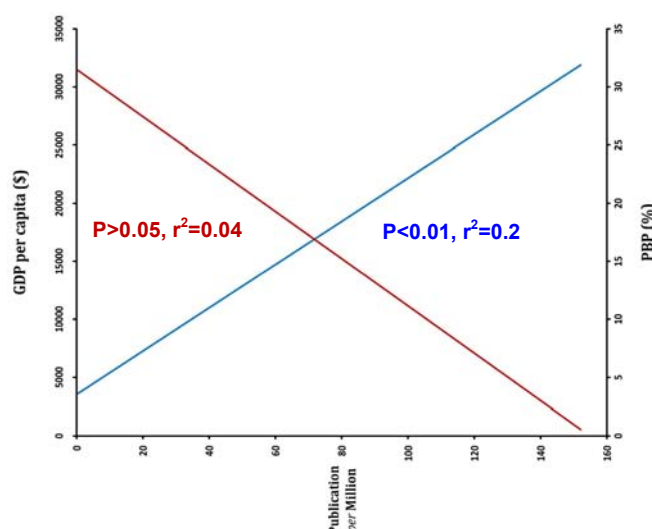


Figure 3: The correlation between gross domestic product (GDP) per capita (\$) and the number of publications per million populations (blue line), and the correlation between population below poverty line (PBP %) and publications per million populations (red line) of Islamic countries. Countries with a total number of publications of less than 50 in the study duration (2002-2009) were not included in the analysis. The number of publications per millions of population was calculated by dividing the total number of publications for each country to its mean of population (in million) during the 8 years of study.

The pub/million to GDP per capita ratios for South Africa (0.79), Russia (1.21), Australia (2.40) or Canada (3.48) were less than that for Turkey. The values of such a variable for other countries were as follows: Brazil; 5.03, Germany; 6.06, UK; 7.87, Japan; 8.5, India; 22.4, China; 26.79 and USA; 28.89.

Population below poverty (PBP) was not known for some countries. Among the Islamic countries, Chad with 80% of population below poverty line had the highest rate of PBP (table 2). Although not significant, there was a negative correlation between the PBP of Islamic countries and their publication productivity ($r^2=0.04$, Spearman's rho, $p=0.12$, Correlation Coefficient = -0.269 figure 3).

Publications Type

Case Report was the most abundant type of publications in Islamic countries with a total number of 18678. Other subsequent types included Comparative Studies, Clinical Trials, Reviews, Randomized controlled Trials, In Vitro,

Controlled clinical Trials, Multicenter Studies, Letters to the Editors and Editorials (figure 4). Some types of publications such as clinical trials increased from 2007 to 2009, but some such as comparative studies decreased (figure 4). Not only in terms of the total and average annual publications, but also in terms of the types of publication Turkey ranked first. The most frequently published medical articles by Turkey were case reports (12686) followed by comparative studies (7397). In the case of Iran the most frequent publication type was comparative study (1290). Saudi Arabia with 1202 case reports ranked after Turkey in terms of publishing this type of publication. Of the total number of review articles (6284), most of them were published by Turkey (2910), Lebanon (695), Saudi (520) and Iran (274). Clinical trials and In vitro studies were the most frequently published article by Turkey (4571 and 530) and Iran (868 and 117). Islamic countries published only 23 editorials, of which 5 were from Turkey and 5 from Iran. Of 59 published letters to the editors,

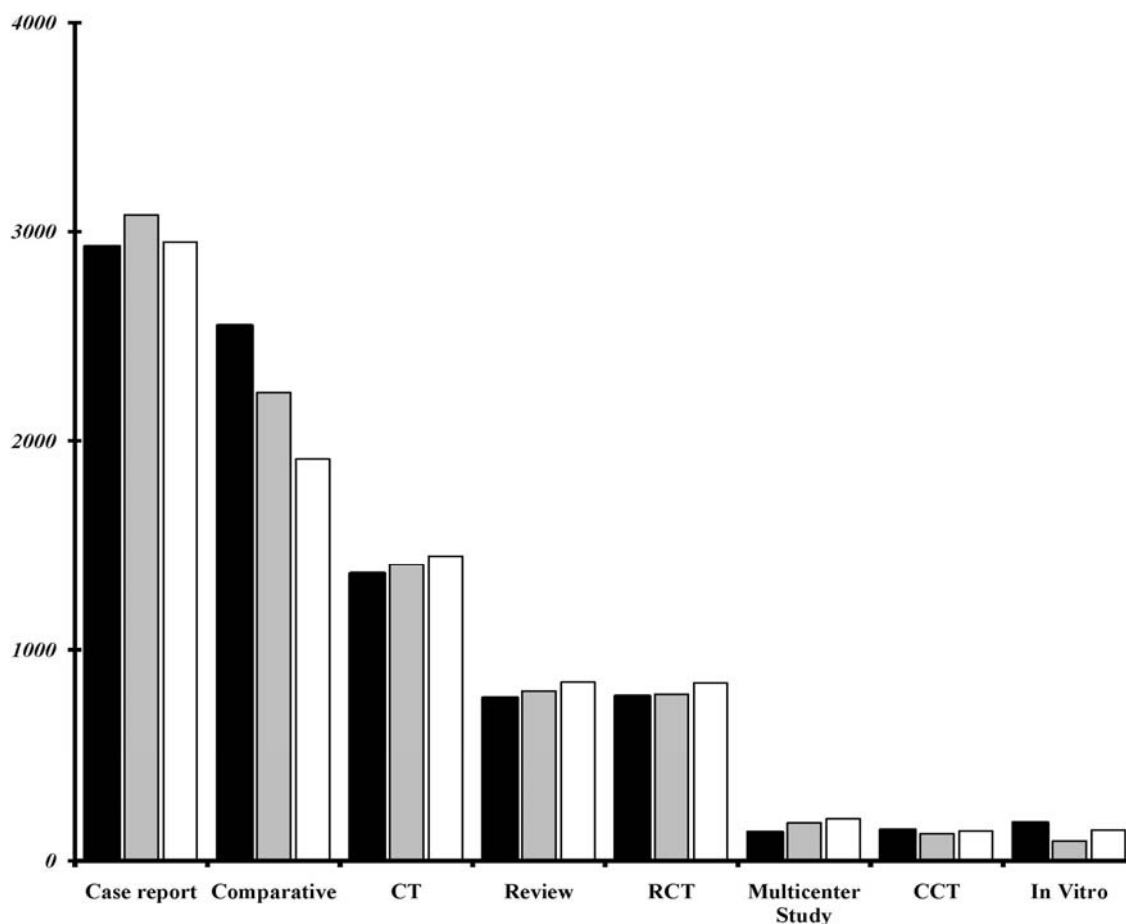


Figure 4: The number and types of publications of Islamic countries in 2007 (black columns), 2008 (gray columns) and 2009 (white columns). Countries with a total number of publications of less than 50 papers from 2002 to 2009 were not included. CT: clinical trial; RCT: Randomized clinical trial; CCT: controlled clinical trial.

36 were published by Turkey, 4 by Saudi Arabia, and 3 by Iran. Turkey and Iran with 2461 and 576 randomized controlled trials articles, respectively had the most share in publishing this type of paper. Also, Turkey published the highest number (614) of controlled clinical trial paper followed by Iran with 64 and Egypt with 54 articles. Turkey did publish 259 papers involving multicenter studies, while Iran published 103 articles of this type.

Discussion

The present study compared the medical publication productivities of Islamic countries in a period from 2002 to 2009 with non-Islamic countries which had high publication productivity.

The findings of the study showed that there were large disparities in publication productivities of Islamic countries as well as great gaps between the publication productivities of Islamic countries and those of non-Islamic developed countries. Turkey, due to possessing the highest number of publications, and Iran for having the highest growth rate in publication productivities may present some merit relative to the non-Islamic developed countries, however, other Islamic countries did have not a merit comparable with those countries. Other Islamic countries are too weak to be compared with developed countries.

Assessment of the productivity by publications per million of population showed that some Islamic countries like Lebanon, Turkey, Kuwait, Qatar and Bahrain had good standings. In addition, Islamic countries gained a better standing in terms publications per million of population when compared with to developed countries. The Islamic countries, with publications per million populations of 55.8, stayed above India and below the other countries with high publications. Brunei, Indonesia, Ethiopia and Sudan together made about 38% of the population of Islamic countries, and published only 2% of the Islamic countries publications. On the other hand, Turkey and Iran, with 7% of the Islamic countries population, published 56% of the articles by such countries.

Annual increase of the publications of Islamic countries is highly affected by publications of Turkey and Iran. Annual increase of the publications of Islamic countries minus Iran and Turkey was less than publications of Turkey alone. Such evidences prove non-uniform development in medical publication productivities of Islamic countries. There is a large gap between publication productivity of Turkey and other Islamic countries. The standing of Turkey

among Islamic countries in terms of publication productivity is similar to that of USA among developed countries. There is a large gap between the number of publications of USA and other developed countries,² as there is a gap between Turkey and other Islamic countries. In a study over two decades from 1988 to 2003, the number of papers in medical and non-medical fields produced by 24 Islamic countries decreased or remained unchanged except for Turkey and Iran which increased from 500 and 100 in 1988 to more than 6000 and 2000 in 2003, respectively.^{14,15} In agreement with previous studies,^{10,15} the present study showed an increasing trend in the publication productivity in medical sciences for Turkey and Iran (figure 1).

The study also showed that the growth rate of publications by all Islamic countries was higher than that for high publishing countries except for China and USA. The Turkey's growth rate of publication was higher than those of South Africa, Russia and Japan. These findings emphasize the importance of Turkey among Islamic countries. Moreover, Iran with a total publication less than that of South Africa or Russia had a rate of increase in publication higher than those of these countries in 2009 (figure 2).

The rate of publication in Iran from 2002 to 2009 increased 13.63 times, which was the highest among Islamic countries. It was also higher than those of USA (1.37), Japan (1.15), UK (1.33), Germany (1.51), China (5.37), Canada (1.72) and Brazil (3.28). The rate of publication for Turkey increased 3.45 times, which was higher than those for non-Islamic countries except for China (5.37). The rate of publication for all Islamic countries from 2002 to 2009 increased 3.13 times, which was more than those for non-Islamic countries except for China and Brazil (3.28). Such findings are in agreement with the findings of a more recent study (1980-2009), which showed that the Middle East publication growth rate were nearly four times faster than that of the world.¹⁶ Moreover, similar to the findings of the present study, Archambault,¹⁶ confirmed the leading role of Iran and Turkey with a publication rate of 11 and 5 times faster than that of the world, respectively.

There is an erratic correlation between GDP per capita and the number of publications in Islamic countries. For instance Qatar, with highest GDP among Islamic countries, is 25th in terms of the number of publications, while Kuwait has a good GDP per capita and reasonable number of publications is 10th among

Islamic countries. It seems that GDP per capita has a little effect on scientific productivity. A reasonable correlation may be obtained by replacing GDP per capita with pure GDP, which is spend for research and educations in each of Islamic country . However, a study on USA and other European countries showed a positive correlation between the GDP and the growth of publication productivity.² It has been suggested that a nation's funding is an important determinant of publication in English-based medical journals.¹⁷ Another reason for the disparity between GDP per capita and the publications of Islamic countries might be the result of low GDP per capita in most of these countries while the number of publications is highly variable from one country to another. It has been reported that the research funding in Islamic countries are all among the lowest in the world, while many Islamic countries, particularly the richest ones, spend more on armaments than on sciences, education or health.^{14,18} Turkey, which is not rich and has a GDP per capita of 12,000\$, is the most successful country in Islamic world to publish papers in medical sciences. Such a success might have derived from the Turkey's interest to join the European Union (EU) and/or from the change of the country's alphabet from Arabic to Roman, which might have ensured easier access to western writings.¹⁷

The correlation between PBP% and the number of publication showed that the scientific productivity might not be significantly affected by financial conditions in each Islamic country. Iran with PBP of 40% showed a high publication productivity, which means that PBP might not be an important factor in publication productivity. The performance of Iran in response to hard conditions like 8 years of war with Iraq showed that in contrast to Iraq, Iran experienced a rapid growth in scientific productions, which was faster than Brazil, Russia, India and China.¹⁶ The growth of scientific production in Iran includes a wide range of sciences from nuclear technologies to immunology, psychology, animal sciences, marine biology and biology in general.¹⁶ The findings of the present study confirm Iran's development in the field of medicine and related sciences.

There is a trend to publish some types of papers such as Case Reports. Experimental investigations such as *In vitro* studies are rare in Islamic countries. Except for Turkey that leads the Islamic countries in all types of publications, other Islamic countries tend to publish some types of publications more than the others. For instance Saudi Arabia published more

Case Reports and Lebanon published more Review Articles.

The present study suffers from a number of limitations. Although PubMed was found to be useful for extracting the scientific productivity in the field of medicine, there are few other databases which when used simultaneous with PubMed would result in a more accurate extraction of published papers. Moreover, the PBP% for some Islamic countries were not reported in the reference site that was used in the present study (CIA World Fact Book), therefore such data pertinent to those countries were not analyzed. Another limitation of the present study was the consideration of publications of each Islamic country by its name and related centers without any regard to the authors of non Islamic origin. For example it could happen that the research was conducted in an Islamic country, while the research was performed by an author of non-Islamic origin or was sponsored by international granting agencies.

Conclusion

While there are problems in most of the Islamic countries with publication productivity, there is a promising trend of publication productivity in some others. The great variations between GDP of the countries made it hard to predict a clear relation between GDP and publications. Finally, despite the low number of publications, the rate of growth of publication productivity seems promising in Islamic countries. Further studies can be helpful to evaluate the role of other possible variables affecting the of scientific publications in the Islamic countries.

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