

Iranian Stem Cell Research Trends: Bibliometric Analysis as a Tool For Mapping Trends From 1995 to 2010

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Abstract: This Bibliometric study was carried out to investigate the trends in stem cell research in Iran from 1995 to 2010. Original research and review articles were considered and publications were identified with the keyword "stem cell" and an affiliation to an Iranian institution. Data were obtained from the Institute for Scientific Information (ISI) Web of Science databases and Scopus. We found 491 articles published since 1995. The mean number of citations per publication was 3.928 and the most frequently cited paper received 76 citations. Articles were published in journals with impact factor that ranged from 0.46 to 8.1. We have observed an increasing trend in stem cell publications based on research done in Iran, although the rate of citations of these papers was low.

Key words: Bibliometric Method • Stem Cell • Trend • Iran

INTRODUCTION

Stem cells are undifferentiated cells that have two particular properties: the ability to differentiate and the ability to self-regenerate. Research on the use of stem cells centers on the treatment for a wide variety of incurable diseases such as Parkinson, diabetes, spinal cord injury and burns [1, 2]. The scientific productivity is a significant country indicator [3], as teaching and research are essential elements of scientific productivity [4]. As a result, the scientific community places great importance on the assessment of research output [5].

Analysis of the scientific literature date back to the beginning of the 20th century [3]. Research assessment is based on indicators of science and technology [4]. Among these indicators, Bibliometric indicators are widely used to assess research production in terms of publications [7]. Citation is an important tool to identify the quality of a paper [8]. The Science Citation Index appeared in 1963 from the Institute for Scientific Information (ISI). Another commonly used Bibliometric indicator is the h-index, introduced by Hirsch in 2005. It reflects both the quantity (number of papers) and quality (citations to these papers) of a researcher's output; however, it is biased in favor of older researchers

who have had more time to be cited. The objective of this study was to determine the publication and citation trends for Iranian stem cell researches from 1995 to 2010 [9, 10].

MATERIALS AND METHODS

The database was obtained from the ISI in Philadelphia, USA and Scopus. We used the keyword "stem cell" and limited this topic with defined affiliation which was Iran and other Islamic. Both original research and review articles were considered. The ISI impact factor for a journal is calculated by dividing the number of citations to articles during a two-year period by the number of citable publications that appeared in the journal during the preceding year. We obtained impact factors of journals from the ISI website. Citations per publication (Cpp) were calculated by dividing total number of citations by the number of publications according to the formula:

$$C_{pp} = 1/p \sum_{i=1}^p C_i$$

where C_i is the number of citations to publication i and P is the number of citable publications.

The h-index was obtained from Scopus [8].

RESULTS

Figure 1 showed the total number of publications based on stem cell research which were published from the 1995 (the first year for which data for this field were available) 1995 to 2010. During this period only four articles have published in international journals and the trend has been increased since 2002.

Searching the Scopus Index, we determined that 4036 stem cell papers published in the Islamic countries from 1975 to 2010. These publications comprised approximately 2.01% of all stem cell research performed worldwide. Our data indicate that the leading producers of stem cell research in the Islamic countries were Turkey (29.56 %) followed by Iran (14.25%) and MALAYSIA (5.99%). Table 1 show the total number of publications on

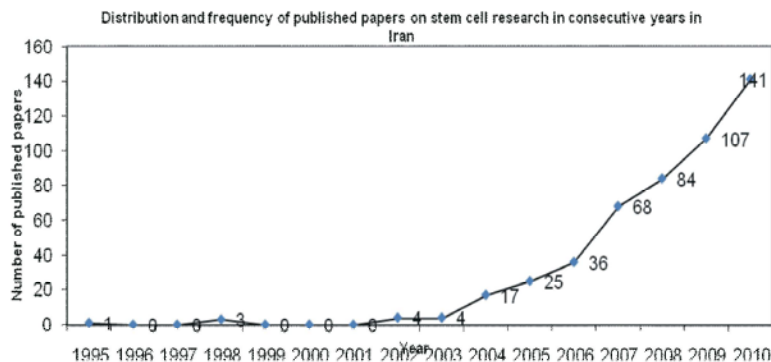


Fig. 1: The total number of publications from Iran on stem cell research published from the first year for which this field was included to the present

Table 1: The total numbers of publications on stem cell in Islamic countries which were published from the beginning of this field up 2010

Islamic Countries	Number of Publication	Islamic Countries	Number of Publication
Republic of AZERBAIJAN	3	Hashemite Kingdom of JORDAN	0
Islamic Republic of AFGHANISTAN	0	Republic of ALBANIA	0
State of the UNITED ARAB EMIRATES	0	Republic of INDONESIA	0
Republic of UZBEKISTAN	1	Republic of UGANDA	0
Islamic Republic of IRAN	575	Islamic Republic of PAKISTAN	189
Kingdom of SAUDI ARABIA	0	BRUNEI-DARUSSALAM	0
Republic of BENIN	0	BURKINA-FASO (then Upper Volta)	0
Republic of TAJIKISTAN	1	Republic of TURKEY	1193
Republic of TURKMENISTAN	0	Republic of CHAD	236
Republic of TOGO	0	Republic of TUNISIA	88
People's Democratic Republic of ALGERIA	8	Republic of DJIBOUTI	0
Kingdom of SAUDI ARABIA	210	Republic of SENEGAL	27
Republic of SUDAN	137	SYRIAN Arab Republic	136
Republic of SURINAME	0	Republic of SIERRA LEONE	1
Republic of SOMALIA	2	Republic of IRAQ	31
Sultanate of OMAN	63	Republic of GABON	4
Republic of GAMBIA	10	Republic of GUYANA	1
Republic of GUINEA	1	Republic of GUINEA-BISSAU	2
State of PALESTINE	34	Union of the COMOROS	0
KYRGYZ Republic	1	State of QATAR	12
Republic of KAZAKHSTAN	6	Republic of CAMEROON	15
Republic of COTE D'IVOIRE	9	State of KUWAIT	55
Republic of LEBANON	160	Great Socialist People's LIBYAN ARAB JAMAHIRIYA	16
Republic of MALDIVES	1	Republic of MALI	1
MALAYSIA	242	Arab Republic of EGYPT	209
Kingdom of MOROCCO	34	Islamic Republic of MAURITANIA	0
Republic of MOZAMBIQUE	8	Republic of NIGER	73
Federal Republic of NIGERIA	69	Republic of YEMEN	5
People's Republic of BANGLADESH	0		

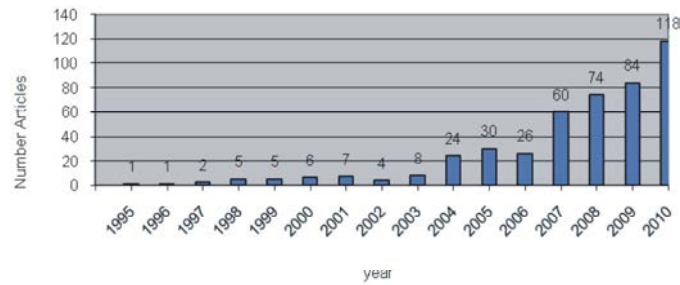


Fig. 2: Number of original articles published yearly from 1994 to 2010

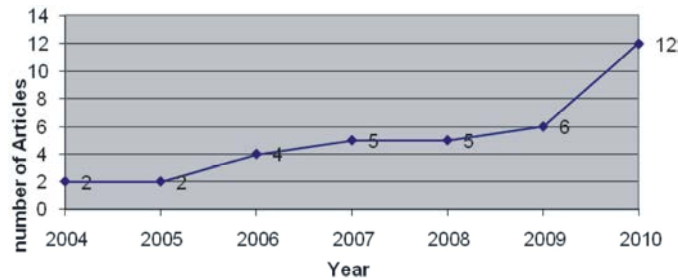


Fig. 3: Number of review articles published yearly from 2004 to 2010

Table 2: The total numbers of publications from Iran in different areas

Subject area	Number	Percentage
Medicine	181	36.94
Biochemistry, Genetics and Molecular Biology	160	32.65
Pharmacology, Toxicology and Pharmaceutics	32	6.53
Immunology and Microbiology	22	4.49
Materials Science	15	3.06
Neuroscience	18	3.67
Agricultural and Biological Science	14	2.86
Engineering	11	2.24
Chemical Engineering	12	2.45
Veterinary Science	7	1.43
Environmental Science	3	0.61
Dentistry	3	0.61
Chemistry	2	0.41
Physics and Astronomy	2	0.41
Health Professions	2	0.41
Computer Science	1	0.20
Nursing	1	0.20
Psychology	1	0.20
Social Science	1	0.20
Multidisciplinary	1	0.20
Undefined	1	0.20

Table 3: The Bibliometric indicators of research publications from Iran

P (Total number of publications)	491
Pf (Year of first publication)	1995
C _{pp} (Citations per publication)	3.928
Ch (Number of cites to the most frequently cited paper)	76
H _{im} (Maximum H index)	20
IF _{max} (Maximum impact factor)	8.1
IF _{min} (Minimum impact factor)	0.46
IF _{ava} (Average impact factor)	2.74

stem cell in Islamic countries which were published from the beginning of this field up 2010. Figures 2, 3 give the number of original and review articles respectively from 1995 to 2010. Review articles emerged from 2004.

We identified the number of publications in each subject. The results showed that the most publications were in medicine, biochemistry and pharmacology (Table 2).

The most active institutes in stem cell research, according to our findings, were the Royan Institute at TarbiatModares University and the Hematology Oncology and BMT Research Center of Tehran University of Medical Sciences.

Table 3 showed the Bibliometric indicators for the entire sample of articles analyzed, which were published in 42 different journals.

CONCLUSION

This study detected an important trends in the rate of Iranian stem cell research publication from 1995 to 2010. Publications in this field have increased in recent years. The quality of publications as assessed with currently available Bibliometric indicators was inadequate, as the mean number of citations to published items was 3.928, a figure lower than what would be expected from the number of publications. Undoubtedly, government support for institutes such as the Royan Institute would have beneficial effects in this field medical research aimed

at developing treatments for troublesome diseases. National laws are an important factor in the progress of stem cell research.

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