

Authorship, institutional and citation metrics for publications on postmenopausal osteoporosis

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Abstract

Introduction Osteoporosis is the most common metabolic bone condition that does not often become clinically clear until a fracture occurs. The objective of the current study was to analyze all publications whose titles included the term “postmenopausal osteoporosis” published during the past decade by journals indexed in the database of SCI-E.

Methods This paper analyzes two sets of data: in the first, all papers with “postmenopausal osteoporosis” in their titles indexed in the database of SCI-E in the period 2001–2011; the second, all papers published by *Osteoporosis International* that were indexed in SCI-E during 2001–2011. The Science of Science Tool was used to map the co-authorship networks of papers published by *Osteoporosis International* in 2007–2011. Only papers cited more than 100 times in the Web of Science were considered for mapping the co-authorship network.

Results A total number of 2,056 papers with “postmenopausal osteoporosis” in their titles were indexed in SCI-E between 2001 and 2011. The annual number of publications increased during the study period. The majority of publications came from Western Europe and North America. The number of papers published by authors based in Western Europe was about 75% greater than for North America.

Conclusion More papers on postmenopausal osteoporosis were published in Western Europe than in North America. The networks of co-authorship pointed to the strategic positions of highly cited authors from Western Europe. The top eight authors contributing the majority of papers were from Western Europe. Consequently Western Europe had greater impact than North America.

Keywords Menopausal women · Osteoporosis · Research activity · Scientometrics

Introduction

Osteoporosis is the most common metabolic bone condition and one which often is clinically silent until a fracture occurs. This has led to it being called the “silent illness.” The bone fractures generally appear in the spine, wrist, and hip. Osteoporosis is a major public health problem that affects hundreds of millions of people worldwide, mainly postmenopausal women [1]. Menopause can increase a woman’s risk of developing osteoporosis, a condition in which bones are weakened and may fracture easily. The decrease in the estrogen level that occurs around the time of menopause can lead to increased bone damage. It is estimated that the average woman loses up to 10 % of her bone mass during the first 5 years after menopause [2]. Osteoporosis is responsible for over 1.5 million breakages in the USA annually, resulting in direct healthcare costs of over \$17 billion per year [3]. As reported by Strom et al.: “Osteoporosis causes more than 8.9 million fractures annually worldwide. Fracture rates are higher in the Western world than in other regions so that, despite the lower population, slightly more than one-third of all osteoporotic fractures occur in Europe” [1].

Approximately 21 % of women aged 50–84 years in the largest countries of the European Union (EU: Germany, Italy, Spain, UK) suffer from osteoporosis [4]. A more recent estimate of the healthcare costs associated with osteoporosis was €29 and €38.7 billion in the five large EU countries (France, Germany, Italy, Spain and UK) and in the 27 EU countries, respectively. Hence the high societal and personal costs of osteoporosis pose challenges to public healthcare systems and physicians, particularly since most patients with fragility remain untreated. Estrogen deficiency seems to be the

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main factor of osteoporosis among menopausal women. According to the report of a World Health Organization study group [5] and other related studies [6, 7], the risk factors for osteoporosis among women include the following:

- Advanced age (>50 years)
- White or Asian ethnicity
- Genetic factors, such as a family history of osteoporosis
- Thin build or small stature (e.g., body weight less than 127 lb)
- Amenorrhea
- Late menarche
- Early menopause
- Postmenopausal state
- Physical inactivity or immobilization
- Use of drugs: anticonvulsants, systemic steroids, thyroid supplements, heparin, chemotherapeutic agents, and insulin
- Alcohol and tobacco use
- Estrogen deficiency
- Calcium deficiency
- Dowager hump

Here we report our analysis of all articles entitled “Postmenopausal Osteoporosis” published in journals indexed in the Science Citation Index Expanded database (SCI-E) during the last decade (2001–2011). Our aim was to visualize the impact of leading countries in the field and to map the authorship network of authors contributing publications to *Osteoporosis International* between 2007 and 2011.

Methods and materials

All data were extracted from SCI-E. Two sets of data were analyzed. The first set included all papers entitled “Postmenopausal Osteoporosis” indexed in the SCI-E from 2001 to 2011. The title menu from field tags was used to limit the extraction of documents to papers entitled “Postmenopausal Osteoporosis.” By restricting our search to titles we were able to identify the most relevant documents in desired subject areas. The keywords “Postmenopausal Osteoporosis” was selected from the lists of titles in the tags menu in SCI-E. This menu is based on the controlled vocabulary of Medical Subject Headings (MeSH).

The second set contained all papers published by *Osteoporosis International* that were indexed in the SCI-E between 2001 and 2011.

The Science of Science Tool was used to map the coauthorship networks of highly cited papers published by *Osteoporosis International* between 2007 and 2011 [8].

Data on the size of the population for the countries included in the analysis were extracted from the website of nation-

online (<http://www.nationsonline.org/ oneworld/population-by-country.htm>) on 15 September 2013 [9].

Results

All papers indexed under the title of “Postmenopausal Osteoporosis” in the SCI-E during the study period (2001–2011) were extracted and analyzed. The extraction of data led to 2,056 papers entitled “Postmenopausal Osteoporosis” (Fig. 1).

As shown in Fig. 1, a total of 2,056 papers were published during the study period, with an average of 186.9 publications per year. The number of papers entitled “Postmenopausal Osteoporosis” in the SCI-E increased during the study period although there were some fluctuations. In terms of number of publications, the most prolific year was 2006 during which time 225 papers were published.

Table 1 shows the country of origin of papers entitled “Postmenopausal Osteoporosis” compiled in the SCI-E during the study period. The most prolific individual country in terms of number of publications was the USA, with 20 % of all global publications entitled “Postmenopausal Osteoporosis” in SCI-E, followed by France (238 papers), England (198 papers), Italy (169), Switzerland (166), Belgium (161), Canada (159), Spain (154), Germany (149), and Turkey (122). In terms of regions, the majority of publications came from Western Europe and North America. Our comparison of the number of papers published by North American authors (the USA and Canada) and Western European authors revealed that the latter published approximately 75 % more papers than North American authors. Most interesting was the finding that Iran, whose authors contributed 20 papers in the field, was ranked 30th among all 80 contributing countries. This placement was higher than that of Israel and India.

The last column (optimized rank) in Table 1 provides data on the number of published papers by each country divided by the number of inhabitants (in millions) of that same country.

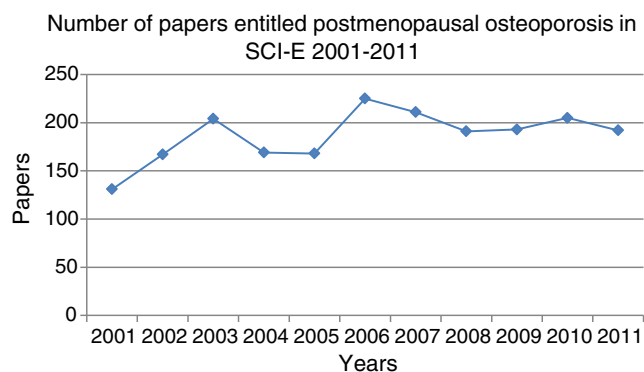


Fig. 1 Number of papers entitled “Postmenopausal Osteoporosis” in SCI-E 2001–2011

Taking this optimized rank into account, the ten top productive countries (after reassessing the respective population size) were Switzerland, Denmark, Belgium, New Zealand, Slovenia, Scotland, Greece, Norway, Austria, and Canada. When we calculated the productivity of countries based on

the number of inhabitants, we found that authors in Western Europe countries were more active than those in North America.

Figure 2 shows that about 50 % of the total number of publications entitled “Postmenopausal Osteoporosis” were in

Table 1 Country of origin of papers entitled “Postmenopausal Osteoporosis” compiled in the SCI-E between 2001 and 2011

Rank	Countries	Number of papers	Percentage	Population (in millions)	Number of papers/million population	Optimized rank
1	USA	696	20	316.555	2.2	21
2	France	238	7	6.535	3.6	13
3	England	198	6	53.012	3.7	12
4	Italy	169	5	5.9464	2.8	17
5	Switzerland	166	5	7.952	20.9	1
6	Belgium	161	5	11.036	14.6	3
7	Canada	159	5	35	4.5	10
8	Spain	154	4	46.185	3.3	14
9	Germany	149	4	80.5	1.9	23
10	Turkey	122	4	74.724	1.6	25
11	Japan	118	3	127.3	0.9	30
12	Denmark	111	3	5.58	19.9	2
13	China	65	2	1,347.35	0	41
14	Poland	61	2	38.501	1.6	26
15	Australia	59	2	22.902	2.6	19
16	Argentina	57	2	40.117	1.4	28
17	Greece	56	2	10.787	5.2	7
18	Netherlands	55	2	16.733	3.3	15
19	Austria	43	1	8.45186	5.1	9
20	Sweden	42	1	9.49	4.4	11
21	Brazil	41	1	192.4	0.2	37
22	Romania	40	1	19.043	2.1	22
23	New Zealand	34	1	4.434	7.7	4
24	Czech Republic	30	1	10.504	2.9	16
25	South Korea	30	1	48.58	0.6	32
26	Scotland	29	1	5.295	5.5	6
27	Ukraine	27	1	45.644	0.6	33
28	Norway	26	1	5.009	5.2	8
29	Hungary	25	1	9.962	2.5	20
30	Iran	20	1	76.8	0.3	35
31	Mexico	20	1	112.336	0.2	38
32	Russia	20	1	143.056	0.1	40
33	Taiwan	19	1	23.29359	0.8	31
34	Slovenia	15	0	2.07	7.2	5
35	South Africa	15	0	50.586	0.3	36
36	Israel	14	0	7.87	1.8	24
37	Croatia	12	0	4.291	2.8	18
38	Bulgaria	11	0	7.365	1.5	27
39	India	11	0	1,210.57	0	42
40	Portugal	11	0	10.561	1	29
41	Saudi Arabia	11	0	27.137	0.4	34
42	Thailand	11	0	65.5	0.2	39

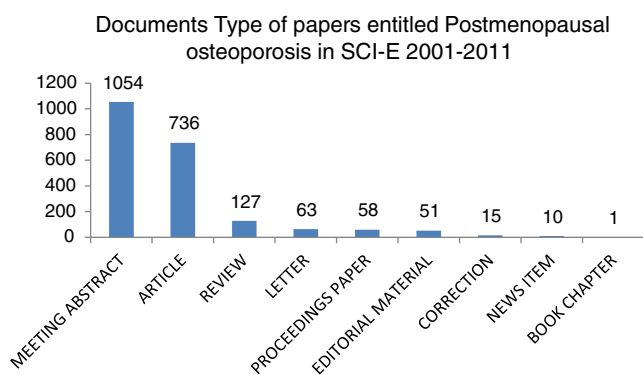


Fig. 2 Publication type of papers in the field of “Postmenopausal Osteoporosis” compiled in the SCI-E 2001–2011

the form of a meeting abstract. Full-length journal articles represented only 35 % of the total number of publications.

Papers entitled “Postmenopausal Osteoporosis” compiled in the SCI-E during the study period were published in 329 different journals. *Osteoporosis International* published by far the majority of articles (22 %), followed by the journals *Bone & Mineral Research* (13 %), *Calcified Tissue International* (4 %), *Annals of the Rheumatic Disease* (2 %), *Arthritis and Rheumatism* (2 %), *The North American Menopause Society* (2 %), *Clinical Endocrinology Metabolism* (2 %), *Bone and Mineral Metabolism* (2 %), and *New England Journal of Medicine* (1 %) (Fig. 3).

The most prolific author was J.Y. Reginster from the University of Liege, Belgium, contributing a total of 84 papers, followed by P.D. Delmas of the University of Lyon, France (69 papers), C. Roux of the Paris Descartes University, France (56 papers), P.D. Miller of the Health Sciences Center, University of Colorado, USA (53 papers), C. Christiansen from the Clinical Research Center of CCBR-Ballerup, Denmark (51 papers), D. Felsenberg of the Universitätsklinikum Benjamin Franklin, Berlin, Germany (50 papers), R. Eastell of the University of Sheffield, Sheffield, UK (46 papers), J.D. Adachi from McMaster University, Hamilton, Ontario, Canada (45 papers), S. Boonen from the Center for Metabolic Bone Diseases, Catholic University of Leuven, Brussels, Belgium (45 papers), and S. Adami from Rheumatologic Rehabilitation,

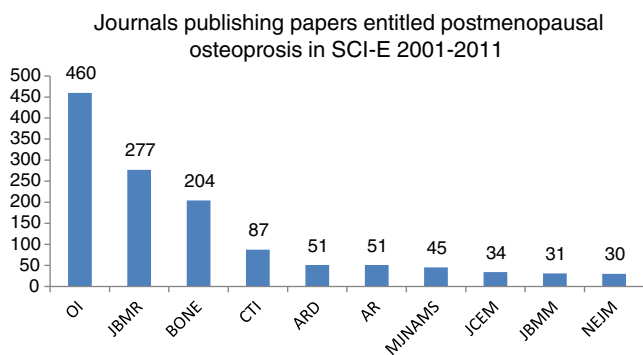


Fig. 3 Ten top productive journals publishing papers in the field of “Postmenopausal Osteoporosis” 2001–2011

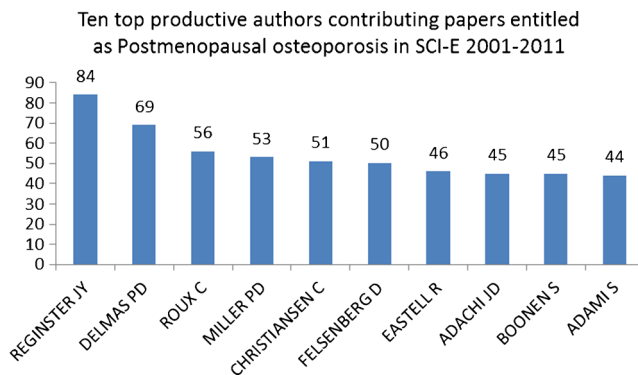


Fig. 4 Ten top productive authors contributing papers entitled as “Postmenopausal Osteoporosis” compiled in the SCI-E 2001–2011

University of Verona, Italy (44 papers). It is remarkable that of the top ten contributing authors, eight are from Western Europe and only two are from North America. This analysis was restricted to authors whose name appears on more than 40 papers entitled “Postmenopausal Osteoporosis” compiled in the SCI-E during the study period (Fig. 4).

A total of 9,024 papers published by *Osteoporosis International* were indexed in the SCI-E during the study period. Figure 5 shows that the most productive years were 2006 and 2011.

The majority of papers distributed by the *Osteoporosis International* originated from American authors followed by authors from England (1,271 papers) and France (738 papers). This analysis was restricted to the countries of the ten most productive authors who published in *Osteoporosis International* during the study period (Fig. 6).

The majority of papers published in *Osteoporosis International* were in the form of meeting abstracts (72 %) and full-length articles (23 %). It is notable that all papers published by this journal were in English and that only one paper was in Welsh (Table 2).

A total of 6,246 organizations contributed articles entitled “Postmenopausal Osteoporosis” compiled in the SCI-E during the study period. The analysis reported in Table 3 is restricted to the 20 top prolific organizations which published articles in

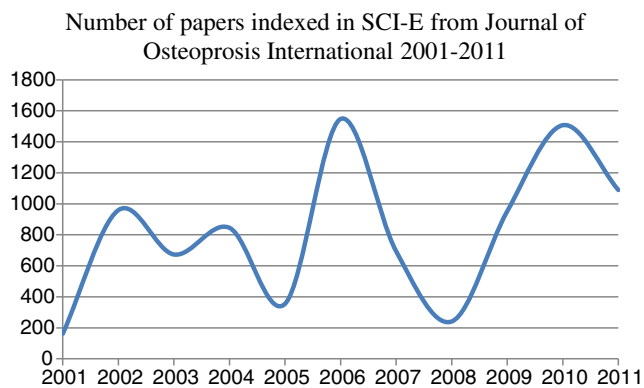


Fig. 5 Number of papers published by *Osteoporosis International* and indexed in SCI-E 2001–2011

Osteoporosis International during the study period. The University of Sheffield, with its 261 published papers, was the most productive of these, followed by University of Liege (240 papers), and then by the University of California, San Francisco (190 papers). It is remarkable that among the 20 top productive organizations in the field, nine are from Western Europe.

A total number of 4,483 papers in different forms were published by *Osteoporosis International* during the period 2007–2011.

Figure 7 shows the co-authorship network of papers published by *Osteoporosis International* between 2007 and 2011. The map is restricted to those papers cited more than 100 times in the Web of Science during the period 2007–2011 and shows the strategic position of some authors in the network. Without the work of these authors the network would be divided into a number of small components. These strategic authors in the co-authorship network are called *cut-points*, and the link between them is called a *bridge* (in the case of missing these links, the network would embrace another isolated sub-networks; in other words, the network would experience a structural hole). These authors are:

1. J. A. Kanis, Medical School of Sheffield University, England, who has authored 68 papers cited 1,716 times in the WoS database.
2. C. Cooper, University of Oxford (NIHR Musculoskeletal Biomed Research Unit), England, has authored 105 papers which have been cited 960 times.
3. R. Rizzoli, Geneva University, Switzerland, has authored 62 papers which have been cited 510 times.
4. C. Roux, Paris Descartes University, France, has authored 58 papers which have been cited 204 times.
5. B. Dawson-Hughes, the Tufts University, USA, has authored 23 papers which have been cited 640 times.

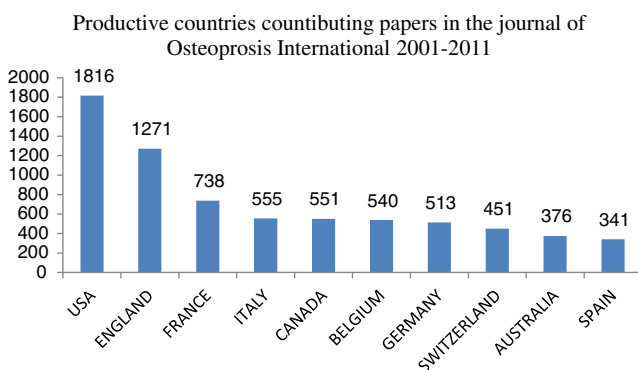


Fig. 6 Top ten productive countries contributing papers in *Osteoporosis International* 2001–2011

Table 2 Document type of publication from *Osteoporosis International* indexed in the SCI-E 2001–2011

Document types	Number	Percentage
Meeting abstract	6,533	72
Article	2,088	23
Review	189	2
Letter	127	1
Proceedings paper	103	1
Editorial material	59	1
Correction	15	0
Biographical item	13	0
Total	9,127	100

Conclusion and discussion

The main focus of our analysis was to evaluate the scientific literature on “Postmenopausal Osteoporosis” that had been indexed in the SCI-E from 2001 to 2011. We found that during the study period a total of 2,056 articles entitled “Postmenopausal Osteoporosis” had been published during the study period and that a total of 2,228 institutes had published in the field of postmenopausal osteoporosis. There was a marked increase in the number of publications during the study period, although some fluctuations were observed. The highest

Table 3 Twenty top productive organizations contributing papers entitled “Postmenopausal Osteoporosis” compiled in the SCI-E 2001–2011

Rank	Organizations	Records	Percent
1	University of Sheffield, UK	261	2
2	University of Liege, Belgium	240	2
3	University of California, San Francisco, USA	190	2
4	McMaster University, Canada	164	1
5	University of Melbourne, Australia	128	1
6	University of Southampton, UK	124	1
7	University of Toronto, Canada	123	1
8	French National Institute of Health and Medical Research (INSERM), France	121	1
9	Merck Co Inc, USA	115	1
10	Hop Edouard Herriot, France	99	1
11	University Hospitals, Geneva, Switzerland	97	1
12	Eli Lilly Co, USA	96	1
13	University of Cambridge, UK	96	1
14	University Claude Bernard Lyon 1, France	94	1
15	Procter Gamble Pharmaceuticals, USA	93	1
16	Columbia University, USA	92	1
17	University Hospitals, USA	91	1
18	Harvard University, USA	87	1
19	University of Manchester, UK	87	1
20	Faculty of Medicine, Czech Republic	82	1

published articles. The majority of papers published by *Osteoporosis International* originated from Western European authors. In terms of types of publications appearing in *Osteoporosis International*, 72 % were in the form of meeting abstracts and only 23 % were in the form of full-length journal articles. It is notable that all papers published in this journal were in English, while only one paper was in the Welsh language. With a total of 261 published papers, the University of Sheffield was the most productive institute contributing papers to *Osteoporosis International*, followed by the University of Liege in Belgium (240 papers) and the University of California, San Francisco (UCSF) (190 papers).

In total, 19,444 authors published their studies in *Osteoporosis International* through the study period 2001–2011. J.Y. Reginster from the University of Liege, Belgium, with 272 papers published in *Osteoporosis International*, was the most productive scientist, followed by C. Cooper C (185 papers) and P.D. Delmas from the University of Lyon, France (159 papers), and J.A. Kanis from the University of Sheffield, England (141 papers).

A total number 4,483 papers in different formats were published in *Osteoporosis International* during the period 2007–2011. Our mapping of the co-authorship network of highly cited papers published by *Osteoporosis International* indicates the strategic position of the authors from four developed countries (i.e., England, France, Switzerland, and USA). The most strategically positioned authors in the network (cut-points) were J.A. Kanis (University of Sheffield), who has authored 68 papers with a total number of citations of 1,716 in the WoS during the period 2007–2011, C. Cooper (University of Oxford), who has authored 105 papers with a total number of citations of 960. Without the work of these authors, the network would be divided in two smaller components.

It should be pointed out that although the USA was the most prolific individual country in terms of number of publications, far more articles were published from Western European authors. Our comparison of papers published by authors from the USA/Canada (North America) and those published by authors from Western Europe revealed that the latter had a 75 % higher publication rate than North American

authors. The network of co-authorship emphasized the strategic positions of highly cited authors from Western Europe. Of the ten top authors contributing to the majority of papers, eight were from Western Europe. Consequently, Western Europe had a more important impact than North America during the study period.

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Conflicts of interest None.

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