

## Publication Trends in the *Journal of Cardiothoracic and Vascular Anesthesia*: A 10-Year Analysis

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**Objective:** Good quality clinical research in anesthesiology is now performed all over the world. The aim of this article was to present and analyze the scientific contributions published in the *Journal of Cardiothoracic and Vascular Anesthesia* and to give a structured view focused on the countries where these studies were performed.

**Design:** Bibliometric analysis.

**Setting:** Teaching hospital.

**Participants:** None.

**Interventions:** The authors analyzed the geographic distribution of the authors publishing in cardiac anesthesia.

**Measurements and Main Results:** Data were obtained from the Scopus database. All works belonging to document-type articles, reviews, letters, and editorials published over a 10-year period (2000-2009) in the *Journal of Cardiothoracic and Vascular Anesthesia (JCVA)* were tracked. For each article, the country of origin of the corresponding author was retrieved. *JCVA* published 1,816 articles from 45

different countries. The United States accounted for 43.8% of the total, followed by India (8.3%), Germany (5.5%), United Kingdom (4.7%), and Italy (4.4%).

**Conclusions:** *JCVA* has a widespread influence and receives contributions from all over the world. More and more biomedical research is conducted outside North America and Europe, with India leading the group of "rest of the world" countries. The recent development of Asian countries clearly challenges North America and European countries that can no longer ignore the scientific contribution from these parts of the world. With this in mind, some journals such as *JCVA* are giving voice to these prolific countries, which represents a fundamental forum for these newcomers to the field of cardiac anesthesia.

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**KEY WORDS:** *Journal of Cardiothoracic and Vascular Anesthesia*, publishing trends, bibliography, developing countries

THE GLOBALIZATION PROCESS of biomedical/clinical research clearly is uninterrupted and ongoing, with more and more trial sites being located outside North America and Europe, as confirmed by a recent analysis of the US clinical trial register.<sup>1</sup> This process also can be measured by publication output. For instance, recent reports from Sweden, Finland, and the United Kingdom show a clear drift of academic output toward emerging countries such as China, India, and Iran.<sup>2,3</sup>

Bibliometric analysis can indicate trends and patterns within scientific disciplines, highlighting national and international strengths and biases in various areas of research. The number of articles published and their countries of origin are important gauges of journal influence and their impact on scientific opinion worldwide. Thus, bibliometric analysis can be considered a macroview of research output. These comparisons and analyses become more relevant when they move away from individuals and toward institutions, nations, and geographic regions. The aim of this bibliographic research was to analyze the trends and geographic distribution of authors publishing in the *Journal of Cardiothoracic and Vascular Anesthesia (JCVA)*.

### METHODS

Scopus is the largest abstract and citation database of peer-reviewed literature and quality web sources with smart tools to track, analyze, and visualize research ([www.scopus.com](http://www.scopus.com)). It was accessed over a two-week period between January 1 and January 14, 2010. The authors searched for scientific manuscripts published in *JCVA* during the 10-

year period between January 1, 2000, and January 1, 2010. The following document types were included: original research papers, editorials, letters, and reviews (in the Scopus database, case reports are included either under the category of research papers or letters). Manuscripts belonging to the following categories were not considered: conference papers, articles in press, notes, short surveys, and errata.

For each article, the year of publication and the country of origin, which was determined on the basis of the corresponding author's address, were noted. The most prolific authors and the most cited articles were tracked on March 1, 2010, thanks to the available tools. The retrieved data were downloaded, saved, and managed with Microsoft Excel 2007 (Microsoft Corporation, Redmond, WA).

### RESULTS

Over the 10-year period, 1,816 articles were published in *JCVA* (median, 169 articles per year; range, 148-222), of which

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**Table 1. Total Number of Articles by Year and Country Ranked by the Total Number of Articles**

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total per Country	Percentage of Total
US	70	80	68	72	61	75	91	106	88	85	796	43.8
India	8	8	7	12	16	19	24	20	19	17	150	8.3
Germany	16	8	11	5	11	7	11	11	8	11	99	5.5
UK	5	11	15	5	13	6	12	7	4	8	86	4.7
Italy	2	4	3	4	9	6	6	12	17	16	79	4.4
Japan	10	7	8	5	6	4	8	8	10	10	76	4.2
Canada	10	4	8	6	8	7	8	6	10	8	75	4.1
Turkey	4	8	3	4	9	14	8	9	6	6	71	3.9
Australia	2	9	4	2	5	2	4	4	5	4	41	2.3
France	7	2	6	3	2	2	6	2	6	4	40	2.2
Netherlands	2	3	1	3	4	1	2	7	2	4	29	1.6
Sweden	5	3	6	5	2	2	1	1	0	3	28	1.5
Belgium	5	1	4	1	1	2	6	2	4	1	27	1.5
Finland	4	3	2	3	3	2	2	5	2	0	26	1.4
Lebanon	4	3	3	1	1	3	3	2	3	2	25	1.4
Spain	0	0	3	3	1	5	2	3	1	5	23	1.3
Israel	4	2	1	5	2	2	0	2	2	1	21	1.2
Denmark	4	3	0	1	1	0	0	3	1	1	14	0.8
Switzerland	1	1	1	3	1	2	1	0	3	0	13	0.7
Singapore	1	0	2	2	1	3	0	2	1	1	13	0.7
South Korea	0	0	1	0	0	4	1	2	1	2	11	0.6
Austria	1	2	0	0	1	0	0	1	3	2	10	0.6
China	0	2	0	0	0	0	1	1	1	3	8	0.4
Greece	0	0	0	1	1	1	1	1	0	2	7	0.4
South Africa	0	0	1	0	1	0	1	0	4	0	7	0.4
Ireland	0	1	1	1	1	0	0	1	1	0	6	0.3
Chile	0	0	0	0	1	0	1	0	0	3	5	0.3
Oman	0	0	0	0	0	0	1	2	1	0	4	0.2
Poland	0	0	0	0	0	0	0	0	0	2	2	0.1
Saudi Arabia	1	0	0	0	0	1	0	0	0	0	2	0.1
Brazil	0	0	0	0	1	0	1	0	0	0	2	0.1
Colombia	0	1	0	0	1	0	0	0	0	0	2	0.1
Hong kong	0	0	0	1	0	0	0	0	1	0	2	0.1
New Zealand	0	0	0	0	1	0	0	0	0	1	2	0.1
Sri Lanka	0	0	0	0	1	0	0	1	0	0	2	0.1
Taiwan	0	0	0	0	1	0	0	0	1	0	2	0.1
Czech Republic	0	0	0	0	0	0	0	1	0	0	1	0.1
Hungary	0	0	0	0	0	1	0	0	0	0	1	0.1
Norway	0	0	0	0	0	0	0	0	1	0	1	0.1
Portugal	0	0	0	0	0	0	0	0	1	0	1	0.1
Argentina	0	0	1	0	0	0	0	0	0	0	1	0.1
Iran	0	0	0	0	0	0	0	0	0	1	1	0.1
Kuwait	0	0	0	0	0	0	1	0	0	0	1	0.1
Nigeria	0	0	0	0	0	0	1	0	0	0	1	0.1
Thailand	0	0	0	0	0	0	0	0	1	0	1	0.1
United Arab Emirates	0	0	0	0	0	0	1	0	0	0	1	0.1
Total	166	166	160	148	167	171	205	222	208	203	1,816	100.0

1,323 were articles, 264 letters, 165 reviews, and 64 editorials. The articles came from 45 different countries (Table 1). US authors (796 articles, 43.8% of total) had more than 5 times the number of articles published during this period than India (150 articles, 8.3%), which ranked second in the total number of articles published. Germany, the United Kingdom, and Italy accounted for 99 (5.5%), 86 (4.7%), and 79 (4.4%), respectively.

In order to analyze geographic publication trends, the following 3 groups were considered: the United States, the European Association of Cardiothoracic Anaesthesiologists (EACTA) area, and

the rest of the world (RoW) (Fig 1). Notably, RoW countries showed a steady increase during the study period. The most prolific among the RoW countries were India, Japan, Canada, Australia, and Lebanon. Of these, India and Australia achieved an important increase in scientific contribution to *JCVA* publications, with a growth of 112% and 100%, respectively, during the analyzed period. Although Japan is now ranked second among the RoW countries, its production has not increased over the last 10 years. Similarly, Canada, New Zealand, and Australia had stable scientific productions during the study

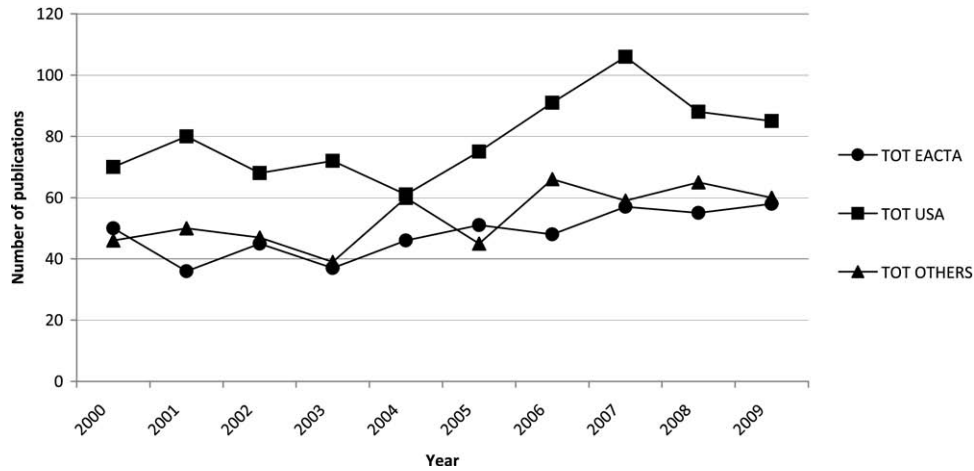


Fig 1. The total number of articles published between 2000 and 2010 in *JCVA* by geographic area.

period. When studying the details of the 7 most prolific countries, the authors noted that North American authors published numerous editorials and reviews, Indian authors often published letters, and European authors published a large number of articles (Fig 2).

Authors from EACTA countries were responsible for 23.8% of the total number of publications, with 5 countries experiencing positive growth during the study period: Italy (+700%),

Netherlands (+100%), Austria (+100%), United Kingdom (+60%), and Turkey (+50%). The most prolific authors in this 10-year study period are listed in Table 2; 4 of them are from the United States, 4 from India, and 2 from Italy. The authors of the most cited articles published in *JCVA* during the last 10 years are listed in Table 3. These articles<sup>4,13</sup> were all published between 2000 and 2004. Three of these manuscripts came from the United States; 3 came from Germany; and 1 each from Sweden, Lebanon, Italy, and Israel.

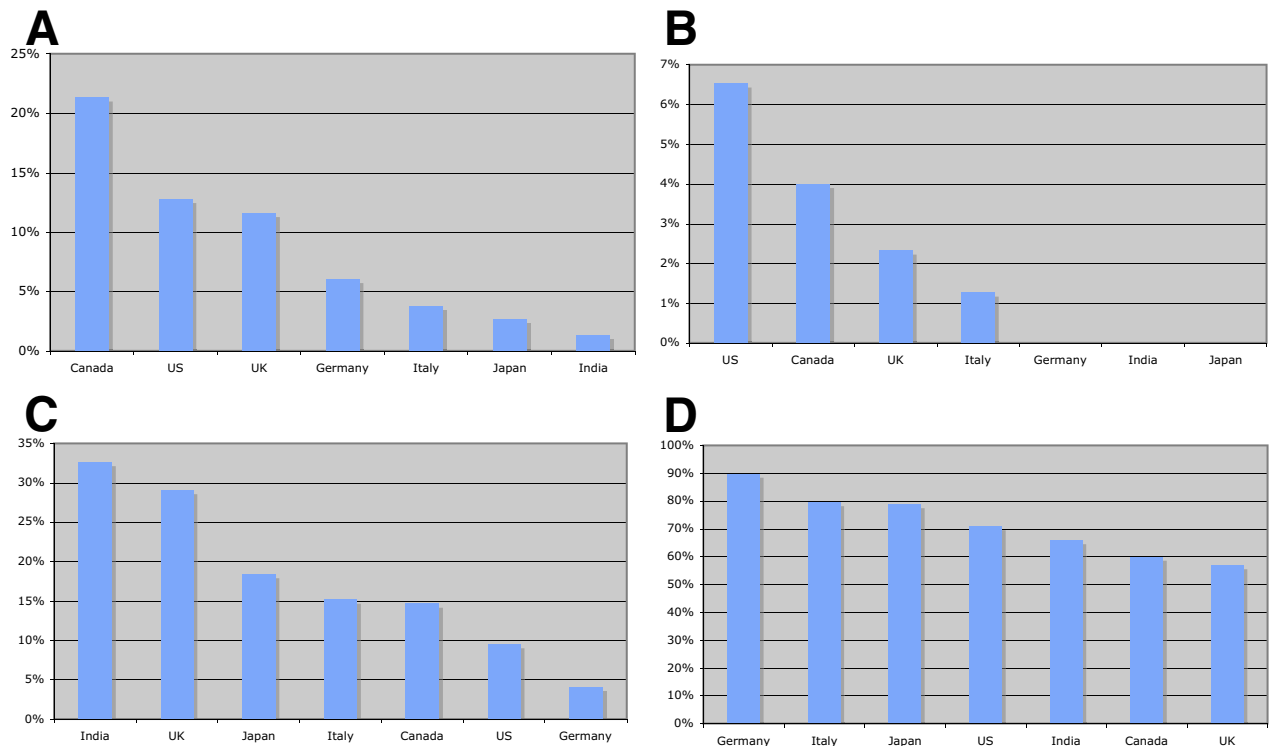


Fig 2. Document types (percentage) published by the 7 most prolific countries: (A) reviews, (B) editorials, (C) letters, and (D) articles.

**Table 2. Most Prolific Authors Between 2000 and 2009 Ranked by the Number of Publications**

Number of Papers	Author	Country	City	Institution
35	Pagel PS	US	Milwaukee	Zablocki Veterans Affairs Medical Center
29	Landoni G	Italy	Milan	Università Vita-Salute San Raffaele
24	Neema PK	India	Trivandrum	Sree Chitra Tirunal Institute for Medical Sciences and Technology
24	Rathod RC	India	Trivandrum	Sree Chitra Tirunal Institute for Medical Sciences and Technology
24	Zangrillo A	Italy	Milan	Università Vita-Salute San Raffaele
22	Augostides JGT	US	Philadelphia	University of Pennsylvania School of Medicine
21	Sinha PK	India	Trivandrum	Sree Chitra Tirunal Institute for Medical Sciences and Technology
20	Iqbal Z	US	Milwaukee	Clement J. Zablocki Veterans Administration Medical Center
18	Chakravarthy M	India	Bangalore	Wockhardt Hospitals
17	Lobato EB	US	Gainesville	University of Florida College of Medicine
17	Tempe DK	India	New Delhi	Department of Anaesthesiology and Intensive Care

### DISCUSSION

*JCVA* is a widely read journal, which has received contributions from 45 different countries over the last 10 years. Contributions from RoW countries have grown significantly, with India accounting for 8.3% of the total number of articles published. Over the last 10 years, there has been a remarkable change in biomedical research output. The trend, confirmed in this study, shows that more and more biomedical publications are based on research performed outside North America or Europe, which is consistent with the results of recently published large bibliometric studies.<sup>14</sup> Such studies showed that the top 5 countries with the largest growth in overall biomedical scientific production from 2008 to 2009 were Iran, South Korea, Taiwan, Turkey, and China. All of these countries published in *JCVA* during 2008 and 2009 although they still need to develop specific scientific production in the field of cardiothoracic and vascular anesthesia.

Japan always has been considered the most scientifically advanced country in Asia. The authors found that Japanese contribution to *JCVA* has not increased over the past 10 years, a fact that distances it from the "Asian trend." Japan, together with Australia, New Zealand, and Canada, should, therefore, not be considered as RoW countries because their trends are similar to what is taking place in the United States and EACTA countries. Notably, none of the most prolific authors is first author of one of the most cited *JCVA* articles, underlying the fact that the total number of articles produced does not necessarily correlate to the scientific relevance (when assessed by the

number of citations). Nevertheless, the number of works published alone remains, in the authors' opinion, a reliable marker of intellectual effort.

### Limitations

Only the address of the corresponding author was analyzed, and the authors did not consider all of the authors of an article, therefore possibly ignoring the countries where part of the research took place. The relatively small number of articles published per year made it difficult to establish a reliable baseline for statistical considerations, especially in those countries that publish few articles per year. Moreover, the number of pages in *JCVA* has increased during the studied period (particularly in 2006), possibly accounting for some of the rise in the number of published articles. Nevertheless, this analysis was focused on the relative contribution of each country/group of countries to the total amount of articles every year.

The authors also would like to acknowledge that the number of publications is not necessarily a full indication of research activity and that clinical research depends on support (departmental or governmental), and this could be behind the trends over time observed in this article. Lastly, the data presented in this article are limited to the *JCVA* setting and could not be extended to the entire cardiac anesthesia and intensive care literature.

**Table 3. Authors of the Most Cited Articles Published Between 2000 and 2009 Ranked by Number of Citations per Article**

Number of Citations	Year of Publication	Author	Country	City	Institution	Reference Number
91	2000	Jönsson H	Sweden	Lund	University Hospital	4
70	2000	Koster A	Germany	Homburg/Saar	Universitätsklinik des Saarlandes	5
66	2002	Sageman WS	US	Richmond	Virginia Commonwealth University	6
65	2001	Haroun-Bizri S	Lebanon	Beirut	American University of Beirut Medical Center	7
63	2004	Bove T	Italy	Milan	Vita-Salute University-IRCCS San Raffaele Hospital	8
63	2000	Zöllner C	Germany	Munich	Ludwig-Maximilians University of Munich	9
58	2004	Yao FSF	US	New York	New York Presbyterian Hospital	10
55	2003	Herr DL	US	Washington	Washington Hospital Center	11
55	2001	Wiesenack C	Germany	Regensburg	University Hospital	12
54	2003	Landesberg G	Israel	Jerusalem	C.C.M. Hadassah University Hospital	13

## CONCLUSIONS

*JCVA* is a leading global forum for the dissemination of research and communication in cardiothoracic and vascular anesthesia, together with related issues. The results of this study of the geographic distribution of authors show that the journal reflects the research and views of scientists from all over the world. Given the large number of authors and coun-

tries publishing in *JCVA*, together with the number of citations for the more appreciated articles, it is clear that *JCVA* enjoys a widespread influence in its field.

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