

ANALYSIS OF SCIENTIFIC ARTICLES PUBLISHED IN TWO GENERAL ORTHOPAEDIC JOURNALS

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ABSTRACT

Objective: To give an overview of the behaviour and scientific contributions of the Journal of Bone and Joint Surgery American (JBJS-A) and British Volume (JBJS-B). **Methods:** 480 original articles published in 2009 were identified through a combined comprehensive computer and manual library search. Articles were assigned to 11 orthopaedic categories and by country, type and specialty of the institution. Possible grants and citations were analysed. USA led all countries in published articles (36,87%), followed by UK (20,62%) and South Korea (5,83%). Most studies published were performed

at academic institutions (65,83%), only 4,16% at private practices. **Results:** Almost half of the articles (46,24%) were published in three categories: hip (19,16%), knee (13,75%) and trauma (13,33%). In both journals 47,15% articles had at least one funding source. A review of articles published in major journals allows to show how research in orthopaedics is distributed worldwide. **Conclusion:** This study shows that a variety of different journals is necessary to reflect the broad spectrum of orthopaedics in depth. **Level of Evidence III, Retrospective Comparative Study.**

Keywords: Journals. Statistical analysis. Orthopedics.

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INTRODUCTION

Orthopedics is the medical specialty dealing with the management of musculoskeletal disorders. According to a recent World Health Organization (WHO) report, musculoskeletal disorders pose one of the major health care burdens globally.¹ The burden of musculoskeletal diseases is not as highly visible as conditions such as cardiovascular and respiratory diseases or cancer, since musculoskeletal diseases rarely are a cause of death. However, they are more prevalent and a major cause of pain and reduced quality of life in patients.¹

Orthopedics deals with patients of all age groups from pediatrics to geriatrics, and covers a wide range of clinical conditions from congenital or degenerative ones to tumors and acute traumas of the whole body. In all of these cases orthopedic surgeons are involved in prevention, diagnosis and treatment. Research in the musculoskeletal system covers basic and clinical aspects. The development of orthopedics was always very technology driven by improving diagnostic methods and interventions both surgical and non-surgical. To inform clinicians and researchers scientific journals provide an information source presenting these innovations and advancements. The Journal of Bone and Joint Surgery American and British Volu-

mes (JBJS-A and JBJS-B) are two major scientific journals with a global readership covering the whole range of orthopedics. Various analyses have been performed on articles that were published in orthopedic journals. Analysis of classic and most cited papers,^{2,3} quality and evidence of studies,^{4,5} distribution of contributing countries,⁶ impact factors of the journals and factors influencing these or trend analysis in publication behavior have been done.⁷⁻⁹ However, no extensive analysis has been performed of these two major journals in a single year and on the impact of published articles. Such analyses have been performed in other specialties, like plastic surgery, rheumatology and dermatology.¹⁰⁻¹² The aim of the present study was to give an overview of the publication behavior and scientific contribution of the JBJS-A and JBJS-B in the year 2009 and its subsequent impact.

MATERIAL AND METHODS

This analysis focused on all scientific papers (original articles) published in the Journal of Bone and Joint Surgery American (JBJS-A) and British Volume (JBJS-B) in the year 2009.

These two journals cover and represent the whole field of orthopedics and are top ranked in their category. The JBJS-A is published by The Journal of Bone and Joint Surgery, Inc. and

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edited by an American editor from their US office in Needham, Massachusetts, USA and the JBJS-B is published by The British Editorial Society of Bone and Joint Surgery and edited by a British editor in London, UK. The JBJS-A Impact Factor was 3,427 (ranked first out of 56 in the "Orthopedics" category) and 2,655 for JBJS-B (ranked fourth out of 56 in the "Orthopedics" category) according to the Thomson Reuters Journal Citation Reports in 2009.

All original articles published in JBJS-A and JBJS-B from January through December 2009 were evaluated. Articles were identified through a combined comprehensive computer and manual library search. All original articles, either clinical or experimental, were included in the analysis. Other types of publications such as reviews, case reports, and letters were excluded from the analysis. Basic author and institutional information was assessed by reviewing the contact data given by each article's corresponding author. Each article published in the JBJS-A and JBJS-B was assigned to a single country in accordance with corresponding author's address, because the corresponding author is usually primarily and mainly responsible for the whole study project¹³.

The country of the institution, type of institution (academic, non-academic institution or private practice), specialty of the institution (orthopedic and orthopedic related specialty or other), possible grant support (governmental, non-governmental organizations or private funds, commercial companies) and possible prior presentation at a meeting (oral or poster presentation) were analysed. Articles were assigned to eleven Orthopedic categories as follows: basic science, foot & ankle, general, hand & wrist, hip, knee, oncology, pediatrics, shoulder & elbow, spine, and trauma. To analyse the impact of the articles published in 2009 Thomson Reuters Web of Science was searched for the ten most cited papers in the JBJS-A and JBJS-B in the subsequent years 2010 and 2011.

Statistical method

For descriptive statistics data was entered and analysed using Microsoft Excel Version 12.2.0 (Microsoft Inc., Seattle, WA, USA).

RESULTS

In 2009 in both the JBJS-A and JBJS-B 480 original articles were published. The JBJS-A published 246 scientific articles (20,41 articles per issue) and the JBJS-B 234 articles (19,5 articles per issue), respectively.

Country distribution

In JBJS-A and JBJS-B most articles were from North America ($n=196/40,83\%$) and Europe ($n=192/40\%$) followed by Asia ($n=74/15,41\%$). USA led all countries in published articles in both journals with 177 (36,87%), followed by UK ($n=99/20,62\%$) and South Korea ($n=28/5,83\%$).

In JBJS-A authors of 22 different countries published articles. The highest number of articles was from the USA ($n=160/65,04\%$), followed by Japan ($n=10/4,06\%$), South Korea ($n=10/4,06\%$), the UK ($n=10/4,06\%$) and Canada ($n=7/2,8\%$). Authors of 34 different countries published articles in the JBJS-B. These were led by the UK ($n=89/38,03\%$), South Korea ($n=18/7,69\%$), USA ($n=17/7,26\%$), Canada ($n=12/5,12\%$), Japan ($n=12/5,12\%$) and Switzerland ($n=12/5,12\%$). More results can be seen in Table 1. Publications from North America ($n=167/67,88\%$) domi-

nated JBJS-A followed by Europe ($n=47/19,10\%$) and Asia ($n=27/10,97\%$), whereas most articles in JBJS-B were from Europe ($n=145/61,96\%$), followed by Asia ($n=47/20,08$) and North America ($n=29/12,39\%$). Publications from Africa and South America numbered 6 in JBJS-A and JBJS-B together (1,25%).

Table 1. Country distribution.

JBJS American		JBJS British	
North America	67,88% (n=167)	Europe	61,69% (n=145)
USA	160	UK	89
Canada	7	Switzerland	12
Europe	19,1% (n=47)	Sweden	9
UK	10	Germany	7
Finland	7	France	6
Germany	5	Netherlands	6
Netherlands	5	Austria	3
Greece	4	Belgium	3
Switzerland	4	Norway	3
Italy	3	Finland	2
Austria	2	Czech Republic	1
Denmark	2	Greece	1
France	2	Italy	1
Czech Republic	1	Spain	1
Sweden	1	Turkey	1
Turkey	1	Asia	20,08% (n=47)
Asia	10,97% (n=27)	South Korea	18
Japan	10	Japan	12
South Korea	10	India	6
China	4	Israel	3
Israel	2	China	2
Iran	1	Kuwait	2
Australia & Oceania	1,62% (n=4)	Singapore	2
Australia	4	Jordan	1
South America	0,4% (n=1)	Saudi Arabia	1
Brazil	1	North America	12,39% (n=29)
		USA	17
		Canada	12
		Australia&Oceania	3,41% (n=8)
		New Zealand	4
		Australia	3
		Melanesia	1
		Africa	1,70% (n=4)
		Egypt	1
		Malawi	1
		Morocco	1
		South Africa	1
		South America	0,42% (n=1)
		Brazil	1

Institutions

The relative distribution of the institutions can be seen in Figure 1. Most studies published were performed at academic institutions ($n=316/65,83\%$), only 4,16% ($n=20$) at private practices. In JBJS-A 90,65% of the publications originated from orthopedic and orthopedic related institutions compared to JBJS-B with 95,29%.

Categories

The relative percentage of each category in JBJS-A and JBJS-B can be seen in Figure 2. Articles in the hip category were the most frequent (19,16%/ $n=92$), followed by knee (13,75%/ $n=66$) and trauma (13,33%/ $n=64$). Almost half the number of articles were published within these three categories (46,24%). Articles in the field of hand and wrist were published just twelve times.

Funding

In JBJS-A 116 out of 246 (47,15%) articles had at least one fun-

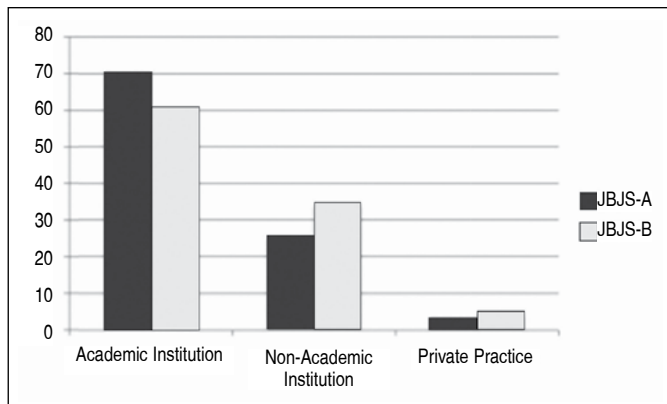


Figure 1. Distribution of Institutions.

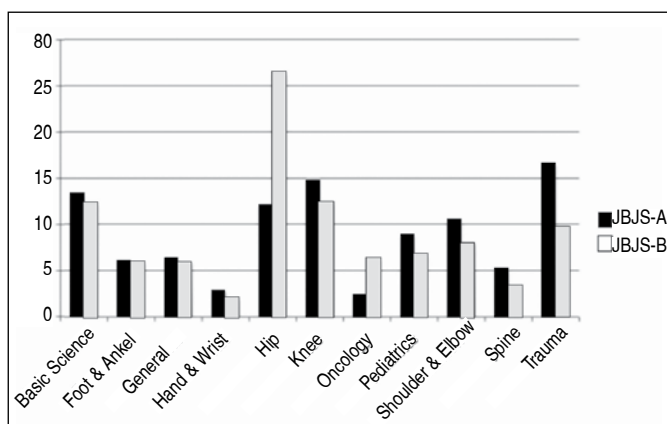


Figure 2. Category distribution.

ding source. In JBJS-A 21,21% of the articles had funding from governmental sources, 36,36% of non-governmental sources and 42,42% from commercial companies. In JBJS-B 35 out of 234 articles received funding by at least one source (13,24%). Out of the articles receiving funding 34,28% were from governmental sources, 22,85% from non-governmental sources and 42,85% from commercial companies.

Prior presentation

In the JBJS-A data from four articles was presented prior to publication at meetings only, whereby in the JBJS-B none of the data has been presented before publication.

Citations

The ten most cited 2009 articles in 2010 and 2011 are presented in Table 2. Also citations were dominated by USA (n=4) and UK (n=4). Germany and Sweden are present with one article each. Regarding the categories, the majority of articles cited in 2010 and 2011 were published in the hip category. The highest cited article was cited 78 times.

DISCUSSION

Articles published in major journals reflect the research interest in a medical specialty. Evaluation of author and institutional information, categories and grant support provide a view of the global distribution of current research activities and future

Table 2. Highly cited articles of the Journal of Bone and Joint Surgery American and British Volumes published in year 2009.

Citations *	Journal	Title	Authors	Nation	Category
78	JBJS-B	Outcomes following hip arthroscopy for femoroacetabular impingement with associated chondrolabral dysfunction: minimum two-year follow-up	Philippon MJ et.al.	USA	Hip
67	JBJS-A	The epidemiology of revision total hip arthroplasty in the United States	Bozic KJ et.al.	USA	Hip
48	JBJS-A	Open reduction and internal fixation of proximal humeral fractures with use of the locking proximal humerus plate. Results of a prospective, multicenter, observational study	Suedkamp N et.al.	Germany	Trauma
45	JBJS-B	Risk factors for inflammatory pseudotumour formation following hip resurfacing	Glyn-Jones S et.al.	UK	Hip
43	JBJS-B	Oral rivaroxaban for the prevention of symptomatic venous thromboembolism after elective hip and knee replacement	Eriksson BI et.al.	Sweden	General
40	JBJS-B	The painful metal-on-metal hip resurfacing	Hart AJ et.al.	UK	Hip
40	JBJS-A	Bilateral low-energy simultaneous or sequential femoral fractures in patients on long-term alendronate therapy	Capeci CM et.al.	USA	Trauma
38	JBJS-B	Hip resurfacings revised for inflammatory pseudotumour have a poor outcome	Grammatopoulos G et.al.	UK	Hip
36	JBJS-B	Blood metal ion concentrations after hip resurfacing arthroplasty: a comparative study of articular surface replacement and Birmingham Hip Resurfacing arthroplasties	Langton DJ et.al.	UK	Hip
33	JBJS-A	Surgical compared with nonoperative treatment for lumbar degenerative spondylolisthesis four-year results in the Spine Patient Outcomes Research Trial (SPORT) randomized and observational Cohorts	Weinstein JN et.al.	USA	Spine

* Citations in years 2010 and 2011 according to Thomson Reuters Web of Science

trends. To get an overview in the field of orthopedics, two major journals in both the USA and Europe, JBJS-A and JBJS-B, were analysed using 480 original articles published in 2009. In that year in both volumes of JBJS articles were published from 36 different countries (JBJS-A: 22 countries; JBJS-B: 34 countries). This supports the trend towards globalization in research in general over the past decades¹⁴. But according to the former Institute for Scientific Information (today Web of Knowledge, Thomson Reuters) USA lead the rankings in clinical medicine overall¹⁴. International literature is dominated by Anglophone countries. Man et al. show that researchers with English as mother tongue are overrepresented in highly ranked general medical journals. This is true for orthopedics, too¹⁵.

In this study publications from the USA (65,04%) dominated JBJS-A, with UK and Canada placed in the fourth and fifth position, respectively. So, articles from Anglophone countries made up 71,9 % of JBJS-A publications. Whereas most articles in JBJS-B were from the UK with the USA placed third and Canada fourth, all together 50,41% articles from Anglophone countries. However, although most influential research originates from USA and other wealthy countries, to some extent the situation is dissonant with global health needs. Few studies are conducted in developing countries, or receive the attention of other investigators.¹⁶ In this study developing countries (from Africa and South America) are represented with only 1,25% of the publications.

Medical research should reflect public needs more closely. This is why the public sector makes major contributions to academic research, despite the rapid increase in company sponsorship in areas with randomised controlled trials.¹⁷ Also in this study the majority of articles was from academic institutions (Figura 1), whereas only 4,16% were from private practice. Similar results were shown in a recent study published in BMJ.¹⁷

Before analyzing, the articles were assigned to eleven orthopedic categories. Despite the number of categories, in both JBJS volumes almost half the number of the articles (46,24%) were published in three categories: hip, knee, and trauma. Articles in the field of hand and wrist were rare. Clinical data with a high percentage of hip and knee articles is more often published in the JBJS-A, although a lot more basic science manuscripts are submitted. This was shown in a study analyzing manuscripts submitted for publication in JBJS-A showed that most articles were from basic science (25%), followed by adult hip reconstruction (14,9%), shoulder and elbow (11,4%), adult knee reconstruction (9,4%) and trauma (8,7%).⁵

According to a recent analysis of consultations regarding the musculoskeletal system in primary care, the most common causes were spine related, followed by complaints of the knee, foot & ankle, shoulder & elbow and hip¹⁸. In this analysis, most publications were on the hip category whereas spine related articles ranked 9th out of 11 categories (4,37%). In this respect it is necessary to state that there are journals in various subspecialties like journals for spine or hand disorders. Articles covering such research might be missed in journals with a more general perspective like JBJS.

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Funding became a major factor in conducting projects and its publications in medicine in the past. In this study, 47,15% of all JBJS-A articles and only 13,24% of the JBJS-B received funding of at least one funding source. Out of 147 funded articles, 62,58% were from the USA, 10,2% from the UK and 4,76% from Sweden. A study by Man et al. indicates that researchers from countries with strong research funding are overrepresented, while those from countries with low research funding are underrepresented in highly ranked general medical journals.¹⁵ The proportions of the most cited articles funded by pharmacology and biotechnology companies are increasing over the decade. Funding from industry surpassed funding from public sources in 2001.¹⁷ The majority of funding in this study was provided by companies and funding for article published from commercial companies were similar in both journals (JBJS-A, 42,42% and JBJS-B, 42,85%).

Funding from companies provides opportunities for both academics and the private sector. Medical journals distribute scientific knowledge to the community, but they may also be used by industry to promote its interests. Therefore, it is important to control the field and its direction. The best control system is guaranteed by independent journals and their independent editors and reviewers. So, the possible influence of funding on research projects and their publications can be minimized.

Some of the articles published in year 2009 were cited in the following years. Cited articles were dominated by four articles from USA and UK each and one article from Germany and Sweden each. Articles in the hip category were mostly cited. One of them was cited 78 times. Citation of JBJS articles show a similar trend as seen in an analysis of the most cited papers in orthopedics. This ranking was led by USA, UK and Sweden.^{2,3} Although citations are frequent in early years, it may not be appropriate to draw conclusions after only two years follow up.

Publishing scientific articles plays an important role in knowledge transfer between researchers and clinicians. Reviewing articles in a certain field in a certain time period allows to look at the current situation and future developments. But it can also be used to control possible influences of funding bodies, especially the industry. This study shows that a variety of different journals are necessary to reflect the broad spectrum of orthopedics in depth.

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