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Original articles

Japan's share of articles in orthopedics

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Abstract We investigated Japan's contribution to research in orthopedics during the last decade. Articles published during 1991–2000 in highly reputed orthopedics journals were accessed through the MEDLINE database. Articles with an affiliation with a Japanese institution were recorded along with the publication year. The proportions of randomized controlled trials (RCTs), cohort studies, and case reports among the articles from Japan were also generated and compared with the overall number for all articles published in these journals. The shares of the top-ranking countries are presented along with the trend over time. Of the total articles (10551), Japan's share for the selected journals in orthopedics was 8.3% (878 articles), ranking third in the world, after the United States (50.3%) and the United Kingdom (11.2%). The recent increase in the share was not statistically significant for Japan. Proportions of the level of evidence were lower for Japan-originated articles than for the total articles. Japan's contribution to orthopedics research is higher than that in other biomedical fields, but the number of high-quality clinical research studies conducted in Japan in this field was meager, similar to that in other fields.

Key words MEDLINE · Orthopedics · Research productivity · Share of articles

Introduction

A recent report that included only human studies documented that Japan is the second highest research article producer (5.3% of the total) in the biomedical field, following the United States (31.3%).[2] However, based on highly reputed journals, its position slipped to fourth (3.1% of the total articles) for basic science journals and went down sharply to 14th place for general medicine journals (0.7% of the total articles).[1,5] Up to now, little has been known about Japan's contributions to the specific clinical science fields based on high-level journals. We conducted this study to determine the relative contribution of Japan to the field of orthopedics during the last decade and to compare it with that of other top-ranking countries.

Methods

Seven journals related to orthopedics with the highest impact factors [*Journal of Orthopaedic Research*, *Journal of Bone and Joint Surgery (American Volume)*, *Osteoarthritis and Cartilage*, *Spine*, *Journal of Bone and Joint Surgery (British Volume)*, *Journal of Orthopaedic and Sports Physical Therapy*, and *Clinical Journal of Sport Medicine*] were selected from the "orthopedics" category of journals established by the Institute for Scientific Information[3] to obtain the relevant data. The MEDLINE database was searched in May 2002 to elicit the number of journal articles originating from Japanese institutions and published during 1991–2000. The proportion of Japanese contributions to each of the journals was than generated and summed up to determine the net Japanese contribution in this field as a whole. In addition, the proportion of the contributions by each of the countries was ranked in descending order. We also searched the MEDLINE database to elicit the proportion of randomized controlled trials (RCTs), cohort studies, and case reports among the total articles as a whole and separately for Japan. The shares of 20 top-ranking countries were also generated for each year (1991–2000) to examine the time trend.

Statistical analyses

Nonparametric tests for trend were performed using STATA 7.0 (STATA, College Station, TX, USA) to determine any significant change in Japan's contribu-

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tion over that period of time. Tests of significance were two-tailed, and a value of $P < 0.05$ was considered significant.

Results

In total, 10551 articles were published in the selected journals of orthopedics from 1991 through 2000. Among them, Japan's contribution was 878 articles (8.3%). Contributions ranged from 0.5% to 12.4% (Fig. 1) in the various journals. Annually, Japan's contribution increased from 7.1% in 1991 to 9.5% in 1997, with a decrease to 8.9% in 2000 (Fig. 2). This trend was not statistically significant ($P = 0.73$) over the designated period.

Table 1 shows the 20 top-ranking countries in terms of the volume and share of total articles for each country. The United States contributed 50.3% of the total (5308 articles) and ranked top among all the countries followed by the United Kingdom (11.2%), Japan (8.3%), and Canada (5.3%). In the time trend analysis, Canada ($P = 0.02$), Germany ($P = 0.01$), the Netherlands ($P = 0.03$), France ($P = 0.01$), and Norway ($P = 0.02$) showed a significantly positive trend. On the other hand, the shares of India ($P = 0.02$) and Israel ($P = 0.01$) went down significantly during the last decade.

During the last decade the proportion of RCTs as a whole was 4.6% (488 articles) in the selected orthopedics journals, whereas that for Japan was only 0.2% (2 articles). There were eight cohort studies published in these journals, but none was from Japan. On the other hand, the proportion of case reports from Japan was larger than that for entirety (8.0% vs 5.4%).

Discussion

This study indicated that Japan's share of articles in orthopedics was 8.3% in the selected journals, ranking

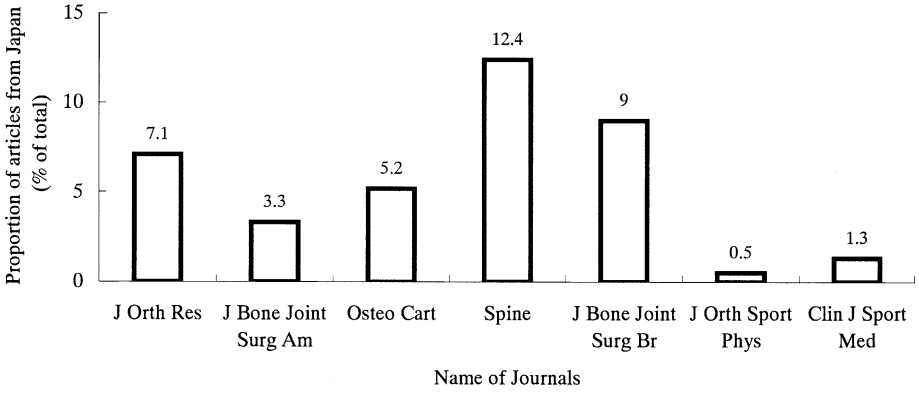

Fig. 1. Proportion of articles from Japan in the selected orthopedics journals during 1991–2000. *J Orth Res*, Journal of Orthopaedic Research; *J Bone Joint Surg Am*, Journal of Bone and Joint Surgery—American Volume; *Osteo Cart*, Osteoarthritis and Cartilage; *Spine*, Spine; *J Bone Joint Surg Br*, Journal of Bone and Joint Surgery—British Volume; *J Orth Sport Phys*, Journal of Orthopaedic and Sports Physical Therapy; *Clin J Sport Med*, Clinical Journal of Sport Medicine

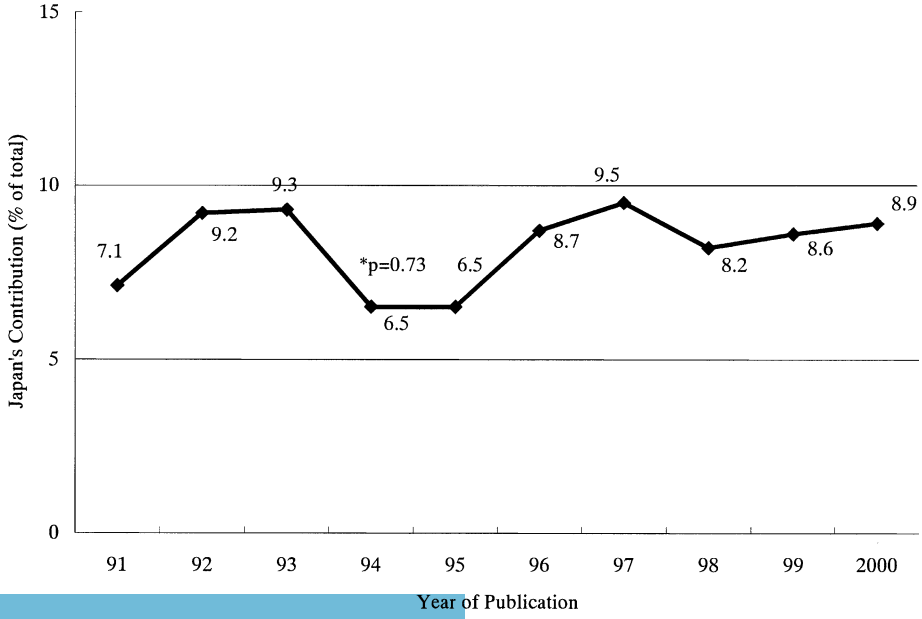

Fig. 2. Time trend of Japan's contributions in selected orthopedic journals. * *P* value of test for trend

Table 1. Share of articles in orthopedics research for 20 top-ranking countries

Country	No. of articles published		
	1991–2000 (n = 10551)	1991 (n = 929)	2000 (n = 1175)
USA	5308 (50.3)	460 (49.5)	558 (47.5)
UK	1185 (11.2)	131 (14.1)	124 (10.6)
Japan	878 (8.3)	67 (7.2)	106 (9.0)
Canada↑	557 (5.3)	45 (4.8)	67 (5.7)
Sweden	282 (2.7)	34 (3.7)	33 (2.8)
Australia	233 (4.8)	13 (1.4)	20 (1.7)
Germany↑	212 (2.0)	9 (1.0)	37 (3.2)
The Netherlands↑	207 (2.0)	11 (1.2)	27 (2.3)
France↑	201 (1.9)	11 (1.2)	28 (2.4)
Switzerland	165 (1.6)	19 (2.1)	19 (1.6)
Finland	158 (1.5)	15 (1.6)	12 (1.0)
China	107 (1.0)	8 (0.9)	11 (0.9)
Italy	87 (0.8)	4 (0.4)	9 (0.8)
India↓	86 (0.8)	12 (1.3)	4 (0.3)
Denmark	80 (0.8)	10 (1.1)	7 (0.6)
Norway↑	73 (0.7)	5 (0.5)	7 (0.6)
Israel↓	72 (0.7)	14 (1.5)	5 (0.4)
Spain	71 (0.7)	6 (0.7)	9 (0.8)
Austria	62 (0.6)	11 (1.2)	12 (1.0)
Belgium	52 (0.5)	6 (0.7)	7 (0.6)

Numbers in parentheses are percentages. Ranking based on the total number of articles published during 1991–2000. Data did not add up to 100% because shares of other countries are not included. Data for China include Hong Kong's share
↑ Share of articles went up significantly over time
↓ Share of articles went down significantly over time

third among all countries. Positive trends regarding the countries' shares were observed for some countries but not for Japan during the last decade, and the proportion of RCTs in articles from Japan was negligible. Japan's share in orthopedics (8.3%), however, seems to be high compared to that in high-quality basic science (3.1%) and general medicine (0.7%) journals.[1] This was attributable in part to the higher proportion of case reports from Japan than that as a whole (8.0% vs 5.4%). Moreover, the small proportion of RCTs in Japan's articles shows that the number of high-quality clinical research carried out in Japan is not up to the mark. A recent study also documented that Japan lagged behind other developed countries in conducting RCTs,[4] although it is ranked second in the world[2] in terms of the total number of articles in the medical field.

There are some limitations of this study. The number of publications elicited from these journals is only a gross estimate of the proportion of Japan's contribution in high-quality orthopedics journals. The absolute number of high-quality journal articles originating from Japan is certainly different from our findings because there are many journals other than the ones we dealt with in this study. However, the proportion of the contributions obtained here is likely to reflect the real situation.

Conclusions

Japan's contribution to research in orthopedics is much higher than in other biomedical fields. However, the number of clinical studies that provide high-level evidence from Japan in this field is meager, like that in most of the other clinical fields.

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