Comparative analysis of ISI (SCI & SSCI) and MEDLINE databases in the Biomedical Sciences: case study of 24 Latin American and Caribbean countries

M. T. Fernández, mtf@cindoc.csic.es; R. Sancho, rosa.sancho@mcyt.es; F. Morillo, fmorillo@cindoc.csic.es; D. De Filippo, daniela@ricyt.edu.ar; I. Gómez, igomez@cindoc.csic.es

Centre for Scientific Information and Documentation (CINDOC), CSIC
Joaquín Costa 22, 28002 Madrid, Spain

Abstract

Taking into consideration the peculiarities of the ISI (SCI & SSCI) and MEDLINE databases, scientific production in Biomedical Sciences of 24 Latin American and Caribbean countries, during the period 1999-2000, has been analysed. The purpose of this work is to compare both databases in relation to the number of references retrieved; visibility of countries and institutions in each database; coverage efficiency in the main scientific areas -basic, clinical and social medicine- as well as in specific topics, coverage of different sources and different languages used for publishing the research results. Collaboration networks at the national, regional and international level are studied.

Introduction

The enhancement of scientific research and technological development systems is of great social and economic importance for the countries, due to its direct relation to the innovation and development of their industrial capabilities. Research requires planning and continuity, as well as large amounts of human and economic resources. But these resources are scarce and will not be invested if they do not produce results, hence the strategic interest for science policy purposes to quantify them. Performance indicators based on bibliographic international databases are the most frequently used to measure the output, although the difficulty consists in detecting intangible or not immediate benefits. Research in Health Sciences has a great strategic importance due to its potential contribution to social welfare, as shown by several studies in different countries (Dawson et al, 1998; Macías-Chapula, 2002). Health Sciences research output is nearly 50% of Latin American scientific production in multidisciplinary international databases.

The databases from the Institute for Scientific Information (ISI) are used internationally due to their special bibliometric characteristics, but they cover “main stream science” only, that is a selection of the most used journals world-wide. Accordingly, those journals from non-central and non-English speaking countries, as is the case of Latin America, are scarcely covered, partly because of their languages. The impact factor of these journals is low, so many of them are not included in the restrictive ISI databases, what in turn originates less visibility and diffusion. In previous studies we have observed that scientific production of the countries is closely related to the number of national journals covered by the database (Gómez et al. 1999b).

Maria Teresa Fernández, Rosa Sancho, Fernanda Morillo, Daniela De Filippo and Isabel Gómez, *Comparative analysis of ISI (SCI & SSCI) and MEDLINE databases in the Biomedical Sciences: Case study of 23 Latin-American and Caribbean Countries*, In: Guohua Jiang, Ronald Rousseau, Yishan Wu (Eds), Proceedings of the 9th International Conference on Scientometrics and Informetrics – ISSI 2003, Dalian University of Technology, Dalian, China, 2003, 55-67.

The objective of the present article is to compare the validity of a very selective multidisciplinary database (ISI) and a specialised medical database (MEDLINE) to retrieve and analyse the biomedical output of Latin-American countries. The coverage of the specialised database as to disciplines, publication journals, and number of retrieved documents will be compared to ISI. Our final goal is to obtain enough information in order to suggest some alternatives to the overall use of ISI databases for bibliometric studies. The main advantages of ISI databases are well known, but shortages and failures could be generated in case of not using other data sources with more local or regional characteristics, moreover for scientific production studies of peripheral or not Anglo-Saxon countries (Sancho, 1992).

Methodology

Documents with publication date 1999 and 2000 in which the "address" field included the name of any of the 24 Latin-American countries were selected from the CD-ROM version of Science Citation Index (SCI) and Social Sciences Citation Index (SSCI) (from now onwards ISI databases) and from the specialised medical database MEDLINE. Synonym and homonym problems were solved.

The thematic classification was made according to the characteristics of each database. Biomedicine in the broad sense was delimited in ISI through the selection of journal categories. The whole thematic coverage of MEDLINE was retrieved, considering it covers only medical topics. Both classifications were matched using the MEDLINE thematic classification to assign journals to ISI categories, but some problems arose: some disciplines as Medicinal Chemistry, Biomethods and Microscopy, are only covered by ISI. Allergy & Immunology are separate disciplines in ISI and only one in MEDLINE.

The retrieved documents were downloaded in related databases developed in CINDOC for bibliometric purposes (Fernández et al. 1993). A semiautomatic classification and codification of the institutions was necessary in order to standardise their names, not always harmonised in the original databases. The documents retrieved from each database were matched to identify duplications. Some analyses were made on the total set, while in other cases the sets from the different sources were studied separately to determine their characteristics.

As "citable items" we considered articles and reviews. Collaboration studies were carried out only on ISI data, as SCI and SSCI databases register the address of all the authors, while MEDLINE registers only the first address per document.

Results

Document sets

The scientific production on Biomedical Sciences of the 24 Latin American countries retrieved from the ISI and the MEDLINE databases were 21967 and 15774 documents respectively, at the considered period. A total of 9950 documents overlap between both databases: therefore 12017 documents are covered only by ISI and 5824 only by MEDLINE (table 1).

The references retrieved were kept in different data bases in order to perform separate analyses able to outline their peculiarities, journal sources, indexing practices, document selection, etc. considering all those factors that could affect the visibility of country output.

Table 1. Documents retrieved and database overlap

	Doc	%
Documents retrieved from ISI (SCI & SSCI)	21967	79.04
Documents retrieved from MEDLINE	15774	56.76
Overlapped documents between ISI and MEDLINE	9950	35.80
MEDLINE documents not covered by ISI	5824	20.95
ISI documents not retrieved from MEDLINE	12017	43.24
TOTAL number of different documents	**27791**	

The overlapped documents, as well as those unique in each of the databases, were studied in detail. The proportion of citable items varies enormously among the databases used, what can be explained by the different criteria used for journal selection and document types to be indexed. The ISI database registers "cover to cover" all document types of the selected journals. Its citable items amount to 14189 (64.6%), and other document types amount to 7778, that represent 35.7% of the total 21967 documents retrieved from ISI. Those "other" documents are meeting abstracts in an important proportion. On the contrary, MEDLINE makes a selection of articles from its source journals based on scientific quality. So that from the 15774 documents retrieved, 99.4% (15678) are citable items and only 0.6% (93) correspond to other document types. Only 36% of the 12017 ISI documents not retrieved from MEDLINE are citable items.

In some cases the same journal covered by ISI and MEDLINE shows a different number of documents due to the different criteria of document selection and indexing of both databases. For example, in the journal *Hypertension*, ISI retrieved 388 documents and MEDLINE 39; in *Journal of Dental Research* MEDLINE retrieved only 6 documents while ISI retrieved 1916 documents, of which 1906 were meeting abstracts not selected by MEDLINE. This last journal published as a whole 6242 items in one year, of which 6119 were meeting abstracts.

Another possible reason of a lower amount of documents retrieved by MEDLINE is that this database registers only the first institutional address in each document, while ISI registers the addresses of all those institutions that collaborate. Therefore in our case, if the Latin-American partners are not first authors in collaborative papers, their output will not be detected through MEDLINE. In this study, when analysing those documents in international collaboration retrieved from ISI, in 59% of them a Latin American author was not in the first position, so these 3802 documents cannot be retrieved from MEDLINE using the strategy of country address.

On the other hand, there are some cases in which ISI covers fewer documents from a certain journal. That happens when it is not a "source journal" but a journal only partially covered by SSCI. This is the case of *Revista de Neurlogía* with only 1 document retrieved from ISI and 196 from MEDLINE.

Journals used for publication

In this period, Latin-American authors have published in 1583 ISI journals, of which only 16 are published in Latin America, with a total amount of 2203 items. In the same period they have published in 1859 MEDLINE journals, of which 42 edited in Latin America. These 42 Latin-American journals published 4232 items (table 2).

Table 2. Latin-American journals covered by MEDLINE and ISI

Country	Journals	MEDLINE	ISI
Venezuela	Acta Cient Venez	44	
Argentina	Acta Gastroenterol-Latinoam	34	
Argentina	Acta Physiol Pharmacol Ther Latinoam	29	
Brazil	An Acad Bras Cienc	31	
Mexico	Arch Inst Cardiol Mex	100	
Venezuela	Arch Latinoam Nutr **	124	3
Mexico	Arch Med Res **	215	222
Brazil	Arq Bras Cardiol	190	
Brazil	Arq Gastroenterol	40	
Brazil	Arq Neuro Psiquiatr **	297	20
Argentina	Biocell **	38	50
Chile	Biol Res	15	
Chile	Bol Chil Parasitol	33	
Brazil	Braz Dent J	33	
Brazil	Braz J Infect Dis	38	
Brazil	Braz J Med Biol Res **	308	328
Brazil	Cad Saude Publica	230	
Mexico	Gac Med Mex	117	
Brazil	Genet Mol Biol **		2
Mexico	Ginecol Obstet Mex	65	
Venezuela	Invest Clin	36	
Argentina	Medicina (B Aires) **	231	318
Brazil	Mem Inst Oswaldo Cruz **	340	363
Mexico	Rev Alerg Mex	34	
Argentina	Rev Argent Microbiol	90	
Brazil	Rev Assoc Med Bras	68	
Costa Rica	Rev Biol Trop	70	
Brazil	Rev Bras Biol	43	
Cuba	Rev Cubana Med Trop	22	
Brazil	Rev Esc Enferm USP	16	
Argentina	Rev Fac Cien Med Univ Nac Cordoba	11	
Mexico	Rev Gastroenterol Mex	33	
Brazil	Rev Hosp Clin Fac Med Sao Paulo	62	
Brazil	Rev Inst Med Trop Sao Paulo	97	
Mexico	Rev Invest Clin **	61	6
Brazil	Rev Lat Am Enfermagen	73	
Colombia	Rev Lat Am Psicol **		18
Mexico	Rev Latinoam Microbiol	38	
Chile	Rev Med Chil **	308	383
Mexico	Rev Mex Psicol **		33
Brazil	Rev Saude Publica **	185	192
Brazil	Rev Soc Bras Med Trop	136	
Mexico	Salud Mental **		101
Mexico	Salud Publica Mex **	106	156
Brazil	Sao Paulo Med J	73	
Jamaica	West Indian Med J**	118	8
	Total	**4232**	**22030**

** Journals covered by ISI databases

The main publication language is English, representing 94% in ISI and 68% in MEDLINE not overlapped with ISI. Spanish and Portuguese represent only 6% in ISI versus 32% in MEDLINE not overlapped with ISI, due to the presence of a larger number of journals written in Spanish and Portuguese in the specialised database.

Analysis by country

Brazil, Argentina, Mexico and Chile are in the first ranking position of the more productive countries. Each of them originates more than 2000 documents, and as a whole they represent 88% of the total Latin-American output. Brazil produces the highest amount of documents, 12837, participating in 46% of the total. The other three countries follow at a distance, and they represent 18%, 17% and 7% respectively (table 3).

Table 3. Output by country and source database

Country	ISI	MEDLINE not ISI	Total Health Sciences	% MEDLINE not ISI
Brazil	10081	2756	12837	21.47
Argentina	4175	763	4938	15.45
Mexico	3519	1171	4690	24.97
Chile	1847	218	2065	10.56
Venezuela	718	235	953	24.66
Colombia	567	102	669	15.25
Cuba	400	218	618	35.28
Uruguay	347	58	405	14.32
Peru	222	27	249	10.84
Costa Rica	142	47	189	24.87
Jamaica	124	89	213	41.78
Guatemala	94	15	109	13.76
Ecuador	82	23	105	21.90
Trinidad & Tobago	77	60	137	43.80
Bolivia	73	5	78	6.41
Panama	63	10	73	13.70
Dominican Republic	38	0	38	0.00
Paraguay	36	3	39	7.69
Nicaragua	28	2	30	6.67
Honduras	27	6	33	18.18
Barbados	26	16	42	38.10
Haiti	13	1	14	7.14
El Salvador	11	0	11	0.00
Belize	3	0	3	0.00
Total documents	21967	5824	27791	

The relative contribution of MEDLINE in Health Sciences in the production of each country varies dramatically from case to case. In the largest countries it goes from 25% in Mexico and Venezuela to 10% in Chile. In the case of Cuba, MEDLINE represents an extra 35%. However, taking into consideration the smaller countries, MEDLINE unique documents represent in some cases more than 40% of their total output (Jamaica and Trinidad & Tobago).

Institutional sectors

University and Health Sectors are the most active institutional sectors according to output measures. Universities are in the first position, participating in 70% of the documents, followed by Hospitals (23%) and Administration (11%). When considering separately the output from each of the source databases, we observe that Hospitals represent a higher percentage in those extra documents coming from MEDLINE (table 4).

Table 4. Output by institutional sector and source database

Institutional Sector	ISI		MEDLINE not ISI		Total Health Sciences	
	Total	%	Total	%	Total	%
University	15897	59.48	3421	58.74	19318	69.51
Hospitals	4881	18.26	1403	24.09	6284	22.61
National Administration	2448	9.16	551	9.46	2999	10.79
Non profit institutions	917	3.43	94	1.61	1011	3.64
Joint research centres	809	3.03	117	2.01	926	3.33
Research Councils	620	2.32	41	0.70	661	2.38
Local Administration	382	1.43	30	0.52	412	1.48
Others	349	1.30	147	2.53	496	1.78
Private Enterprises	216	0.81	18	0.31	234	0.84
Public Enterprises	105	0.39	12	0.21	117	0.42
International Organisations in LA country	104	0.39	19	0.33	123	0.44
Total documents	**26728**		**5824**		**32552**	

When desegregating the data to research centres, in both databases the first is Sao Paulo University in Brazil, with 3498 documents (12.6% of the total) followed by Buenos Aires University in Argentina, with 1248 documents (5% of the total), National Autonomous University in Mexico with 1195, Estadual Campinas University in Sao Paulo and Federal Rio de Janeiro University with 1091 documents each. Hospitals from Mexico and Buenos Aires have also high output (not shown).

Thematic areas

Considering the three general thematic areas, publications of Clinical Medicine are in the first place in both databases, but their relative weight changes: from 56% in ISI to 68% in MEDLINE not ISI. On the contrary, Basic Medicine weighs nearly 50% in ISI and only 27% in MEDLINE. Social Medicine represents a very small percentage in both databases (table 5).

Table 5. Distribution of publications by thematic areas

Thematic area	ISI		MEDLINE not ISI		Total Health Sciences	
	Total	%	Total	%	Total	%
Basic Medicine	10814	49.23	1596	27.40	12410	44.65
Clinical Medicine	12327	56.12	3964	68.06	16291	58.61
Social Medicine	828	3.77	175	3.00	1.003	3.61
Others	0	0.00	399	6.85	399	1.44
Total documents	**21967**		**5824**		**27791**	

Thematic disciplines

At the discipline level, strong differences are also observed, due to the presence in MEDLINE of more clinical documents published in local or regional journals (table 6).

In Basic Medicine the most productive discipline in both databases is Biochemistry/ Molecular Biology, with 3054 documents (11%), followed by Pharmacology/Pharmacy in ISI (1326), and Microbiology in MEDLINE not ISI (200) (not considering Biology, as it was not selected as a medical category in the ISI strategy). In some disciplines as Medicinal Chemistry, Biomethods and Microscopy, MEDLINE does not contribute with extra documents. The highest relative contribution of MEDLINE not ISI is 30% in Anatomy/Morphology, 20% Developmental Biology, 18% Microbiology, and 17% Medicine Research.

Table 6. Disciplines in Basic Medicine

Disciplines	ISI	MED not ISI	Total	% Total Health	% MED not ISI
Biochemistry/Molecular Biology	2766	288	3054	10.99	9.43
Pharmacology/Pharmacy	1326	138	1464	5.27	9.43
Cell Biology	1259	46	1305	4.70	3.52
Neurosciences	1181	44	1225	4.41	3.59
Microbiology	910	200	1110	3.99	18.02
Immunology*	1079	0	1079	3.88	0.00
Medicine, Research	816	173	989	3.56	17.49
Genetics/Heredity	895	46	941	3.39	4.89
Biophysics	611	80	691	2.49	11.58
Endocrinology/Metabolism	658	28	686	2.47	4.08
Physiology	559	92	651	2.34	14.13
Parasitology	504	94	598	2.15	15.72
Biology	0	428	428	1.54	100.00
Medicinal Chemistry	383	0	383	1.38	0.00
Pathology	336	28	364	1.31	7.69
Reproduction	257	40	297	1.07	13.47
Biomethods	278	0	278	1.00	0.00
Virology	223	9	232	0.83	3.88
Behavioural Sciences	193	2	195	0.70	1.03
Developmental Biology	117	29	146	0.53	19.86
Anatomy/Morphology	78	33	111	0.40	29.73
Microscopy	30	0	30	0.11	0.00
Total documents	**21967**	**5824**	**27791**		

Note: *MEDLINE has no Immunology as separate discipline, but Allergy & Immunology

In the area of Clinical Medicine meeting abstracts are a frequent document type through ISI. They amount to more than 70% items in disciplines as Dentistry, Peripheral Vascular Disease and Gastroenterology. The most productive discipline is Dentistry (2301 documents), due to the large number of meeting abstracts covered by the journal *Journa.Dental Research* through ISI. It is followed by Medicine General & Internal with 1838 documents. Those disciplines in which the extra documents contributed by MEDLINE represent more than 40% are: Orthopedics, Medicine, General & Internal, Clinical Neurology, Nutrition/Dietetics. A contribution from 30% to 40% in: Cardiac/Cardiovascular Systems, Biomedical Engineering, Tropical Medicine and Public, Environmental & Occupational Health (table 7).

Table 7. Disciplines in Clinical Medicine

Disciplines	ISI	MED not ISI	Total	% Total Health	% MED not ISI
Dentistry. Oral Surgery & Medicine	2169	132	2301	8.28	5.74
Medicine General & Internal	976	862	1838	6.61	46.90
Public Environmental & Occupational Health	932	444	1376	4.95	32.27
Clinical Neurology	588	496	1084	3.90	45.76
Tropical Medicine	633	359	992	3.57	36.19
Peripheral Vascular Disease	925	57	982	3.53	5.80
Cardiac & Cardiovascular Systems	543	356	899	3.23	39.60
Gastroenterology/Hepatology	691	153	844	3.04	18.13
Hematology	752	37	789	2.84	4.69
Surgery	603	115	718	2.58	16.02
Pediatrics	521	102	623	2.24	16.37
Infectious diseases	508	86	594	2.14	14.48
Nutrition/Dietetics	340	242	582	2.09	41.58
Toxicology	493	29	522	1.88	5.56
Oncology	427	37	464	1.67	7.97
Ophthalmology	356	49	405	1.46	12.10
Obstetrics/Gynecology	300	87	387	1.39	22.48
Psychiatry	355	2	357	1.28	0.56
Radiology /Nuclear Medicine	281	48	329	1.18	14.59
Respiratory System	298	14	312	1.12	4.49
Critical Care Medicine	254	7	261	0.94	2.68
Urology/Nephrology	190	62	252	0.91	24.60
Transplantation	169	13	182	0.65	7.14
Dermatology/Venereal Diseases	160	18	178	0.64	10.11
Biomedical Engineering	94	56	150	0.54	37.33
Rheumatology	133	8	141	0.51	5.67
Allergy*	127	0	127	0.46	0.00
Medicine Laboratory Techniques	87	24	111	0.40	21.62
Otorhinolaryngology	86	25	111	0.40	22.52
Allergy & Immunology *	0	89	89	0.32	100.00
Orthopedics	36	43	79	0.28	54.43
Anesthesiology	53	12	65	0.23	18.46
Substance Abuse	48	6	54	0.19	11.11
Geriatrics/Gerontology	50	2	52	0.18	3.85
Andrology	41	0	41	0.15	0.00
Sport Sciences	36	4	40	0.14	10.00
Medicine Forensic	31	4	35	0.13	11.43
Medical Informatics	26	10	36	0.12	27.78
Neuroimaging	5	0	5	0.02	0.00
Total documents	**21967**	**5824**	**27791**		

Note: *MEDLINE has no Allergy as separate discipline, but Allergy & Immunology

In Social Medicine, Psychology is the most productive discipline, while Nursing is the one better represented in MEDLINE (table 8).

Table 8. Disciplines in Social Medicine

Disciplines	ISI	MED not ISI	Total	% Total Health	% MED not ISI
Psychology	588	1	589	2.12	0.17
Nursing	13	109	122	0.43	89.34
Integrative & Complementary Medicine	102	5	107	0.39	4.67
Health Care Sciences & Services	24	27	51	0.18	52.94
Social Sciences, Biomedical	43	0	43	0.15	0.00
Psychology, Clinical	34	0	34	0.12	0.00
Psychology, Experimental	30	0	30	0.11	0.00
Family Studies	0	25	25	0.09	100.00
Sanitary Education	0	17	17	0.06	100.00
Rehabilitation	13	2	15	0.05	13.33
Health Policy & Services	9	1	10	0.04	10.00
Medical Ethics	2	4	6	0.02	66.66
History of Medicine	0	3	3	0.01	100.00
Psychology, Developmental	0	1	1	0.00	100.00
Total documents	**21967**	**5824**	**27791**		

Collaboration networks

The analysis of local, regional and international collaboration networks could only be established through ISI, as only this database registers all institutional addresses of the publication authors (table 9).

Table 9. Collaboration between institutions and countries (source *ISI*)

Collaboration type	Number of documents			
	1999	2000	Total	%
No collaboration	4095	4595	**8690**	39.6
National Collaboration	4081	4427	**8508**	35.0
Regional LA Collaboration	283	346	**629**	2.6
International Collaboration	3118	3326	**6444**	29.3
TOTAL documents			**21967**	

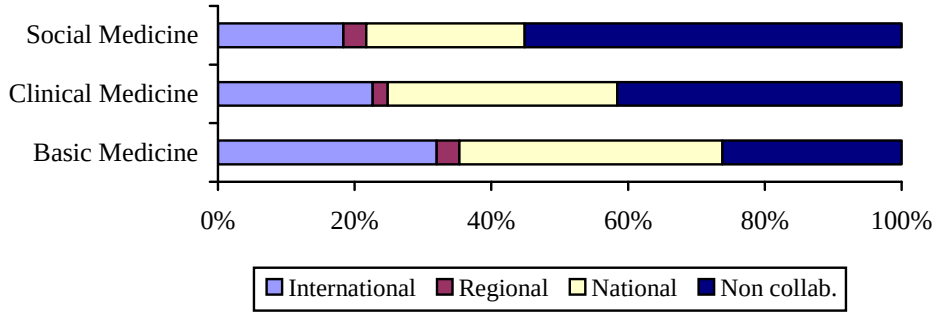
Analysing ISI data, 40% of the documents are signed by only one research centre in a Latin-American country, while more than 60% of the documents are written in collaboration between several centres: 35% of them are written in national collaboration, 2.6% in regional (several Latin American countries) and 29% in international collaboration. The percentages add more than 100 because national, regional and international collaboration can appear simultaneously in the same document, and a multiple counting method has been used.

Different countries have different participation in collaboration networks. Small countries usually have high international collaboration rates (data not shown), perhaps due to their small size they have to find groups working on similar topics abroad. This is the case for six small countries with no national collaboration and high international collaboration rates: Belize (100%), El Salvador (82%), Haiti (69%), Honduras (82%), Nicaragua (89%) and Dominican Republic (89%). On the other hand, large countries have usually higher national collaboration rates and lower international collaboration rates (varying between 22.6% in Argentina and 35.8% in Venezuela). Non-collaboration rates are also higher (42% in Argentina and Brazil). It is worth noting that just one address does not mean just one author:

these items are usually multi-authored. Regional collaboration is small; it amounts to 11% in Costa Rica, Paraguay and Uruguay.

Collaboration differs per thematic area: Basic Medicine has the highest international collaboration rate (36%), while Social Medicine has the highest number of non-collaborative items (58%). The regional collaboration rate as measured through ISI is very low (fig. 1).

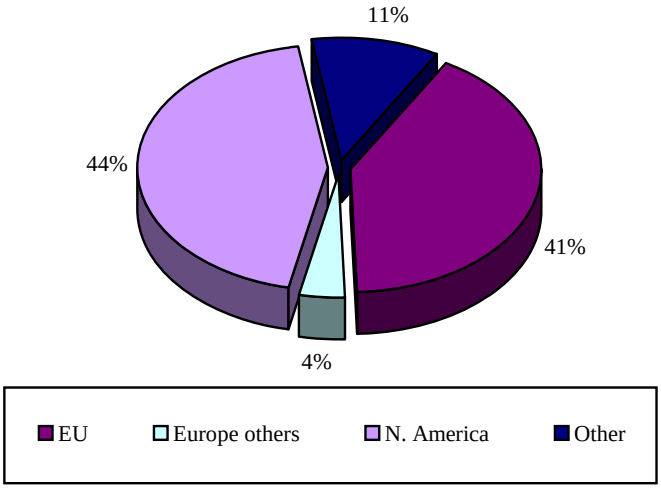
Figure 1. Types of collaboration per thematic area



A total amount of 6444 Latin-American Health Sciences documents were produced through international collaboration, that is, with the participation of a non-Latin-American country.

In figure 2 we can see that North America **(**USA and Canada), as a whole is the first partner, followed by the European Union. When considering the countries separately, USA is the first (16%), followed by United Kingdom (3,6%), France (3,2%), Germany (2,4%) and Spain (2%).

Figure 2. Geographic regions involved in international collaboration



Collaboration networks were analysed as to their size, considering the number of countries involved in regional and international collaborative items. Bilateral and trilateral networks were the most frequent. Exceptionally, there is one document from Uruguay where another 26 countries are co-authors. The “big network”, where four or more countries are involved, frequently represents multi-centre clinical trials in Clinical Medicine.

Discussion

The objective of the present article is to compare the validity of a multidisciplinary database (ISI) and a specialised medical database (MEDLINE) to retrieve and analyse the biomedical output of Latin-American countries. In their comparison there are limitations due to the different classification methodologies used in both databases: ISI classifies journals into one or several categories, while MEDLINE gives keywords to each document as well as journal classifications. We have adopted the ISI classification scheme and classified the extra MEDLINE contribution to ISI categories. According to the subject classification, ISI is more appropriate for macro thematic studies, while MEDLINE is more powerful for microanalyses of scientific areas.

A total of 27791 different biomedical documents from Latin American and Caribbean countries were retrieved for the studied period. Some 36% of the items were present in both databases, but as a whole the contribution of ISI was higher (79% of the total) than that of MEDLINE (57% of the total). It must be noted that 24% of ISI items are meeting abstracts. The fact that all authors' addresses are covered by ISI is an important bibliometric advantage when trying to retrieve the output of a certain country. Nevertheless, MEDLINE contributed with 21% of unique documents that are not present in ISI, as it has a much broader coverage of non-English journals: only 16 Latin-American journals in ISI versus 42 in MEDLINE, producing 2203 versus 4232 items respectively.

The extra contribution of MEDLINE in Health Sciences output of certain countries is very important, particularly in small and medium size countries. In the case of Cuba MEDLINE represents an extra 35%. Even in large countries it attains 25% in Mexico and Venezuela.

Publications concerning the area of Clinical Medicine are in the first place in both databases, but their relative weight changes: from 56% in ISI to 68% in MEDLINE not ISI. In Basic Medicine, MEDLINE only represents 13% extra documents. As a whole, MEDLINE is responsible for 24% of the total amount of Latin American documents of Clinical Medicine not retrievable through ISI.

At the discipline level, strong differences are also observed, due to the presence in MEDLINE of more clinical documents published in local or regional journals (Gómez et al, 1999b; Sanz et al., 1995; Cetto et al., 1998). Particularly, in certain disciplines its contribution represents 40% of the documents. ISI is more appropriate to detect journal articles of international visibility, as well as congress communications, particularly frequent in some disciplines of Clinical Medicine. MEDLINE includes a higher proportion of local and regional journal articles, as well as reviews. Publication language is predominantly English in both databases, although MEDLINE covers also a considerable amount of documents in Spanish (11%) and Portuguese (5%).

In most of the Latin-American countries, Universities have the main infrastructure and capacities for performing R&D, consequently they attain the highest scientific outputs in both databases used, in accordance with previous studies (Oro and Sebastián, 1993). The contribution of Hospitals is particularly important through MEDLINE.

An interesting characteristic is the existence of collaboration networks with extra-regional countries. It indicates relations and opening towards the international community, participation in international projects, exchange of knowledge, ideas and methods, with positive cohesion effects. Basic Medicine has the highest international collaboration rates.

Regional networks were scarce (as detected through the international ISI database), but the different countries were involved in large networks related to clinical trials (Gómez et al, 1999a). In a general sense, the size of the country is inversely related to its international collaborative rate (Luukkonnen et al, 1992) as we have observed in the present study.

In the analyses of the scientific production of any country or region the selection of databases is of great importance. But no database reflects precisely the total scientific production of the country or region, so the use of several databases with different selection criteria clearly enriches the result of the study. Even considering both databases, a selective international multidisciplinary database and a specialised one, we may underestimate the output of Latin-American countries in Health Sciences. The use of a regional database with a full coverage of national journals would be complementary, for example BIREME database, which analyses only national Latin-American journals dealing with Health Sciences, although with a bias in favour of Brazilian journals. On this line, the LATINDEX project has elaborated a Directory and a Catalogue of Latin-American journals based on indirect indicators of scientific quality (Román et al. 2002). In a third stage, this project plans to produce a comprehensive Latin-American database with the contribution of all the countries involved.

Acknowledgements

These results were possible due to a research project financed by RICYT (Red de Indicadores de Ciencia y Tecnología Iberoamericana/Interamericana) (Fernández et al. 2003). The authors want to thank Eva Gonzalez for her technical assistance.

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