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PRODUCTION AND DISSEMINATION OF THE MEXICAN BIOMEDICAL JOURNALS, WITH SOME CONSIDERATIONS OF THE LATIN AMERICAN/CARIBBEAN REGION

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Abstract

A quantitative analysis of 67 Mexican Biomedical Journals (MBMJ), according to their editorship, frequency of publication, subject classification and "in-depth" biomedical coverage, was performed. The inclusion of these journals in six major secondary sources (Index Medicus, Excerpta Medica, Biological Abstracts, Index Medicus Latinoamericano, Chemical Abstracts, and Science Citation Index) was also examined. A comparative analysis of the MBMJ with other Latin American/Caribbean Biomedical Journals (LABMJ), as covered by these sources, was performed. Science Citation Index' Journal Citation Reports was used to analyse the citation pattern of the only MBMJ (Archivos de Investigacion Medica) covered by Science Citation Index. Again, a comparison with other three LABMJ was made.

Regarding the biomedical journal production and dissemination in the Latin American/Caribbean region, Mexico was found to rank second, preceded only by Brazil. After Mexico, in descending order followed : Argentina, Chile, Venezuela, Cuba, and Colombia. These seven countries were also found to be the higher contributors to publications outside the region.

Although interesting results were found regarding the citation analysis of four LABMJ, these isolated results do not lead to any conclusions regarding the citation patterns of the Mexican or Latin American/Caribbean journals. Further studies need to be performed to obtain indicators which help measure the national and regional contribution of these countries to the world in the biomedical field.

INTRODUCTION

It is well known that scientific journals play an important role in the transference of scientific information. This transference of current knowledge has been shown to exist not only within the members of a particular discipline but also among several disciplines and among several countries. Journal citation studies have indeed demonstrated which are the highly cited journals among disciplines and among countries, thus leading to rough measures of a country or a discipline contribution to the building-up of science.

Less Developed Countries (LDC) face many difficulties in measuring their scientific contribution mainly for two reasons : firstly, several social, economic and even political factors seem to affect their scientific information life-cycles [1-5] thus making them unable to adequately organize and administer their information production; and secondly, very few LDC journals are covered

by the Science Citation Index' Journal Citation Reports (SCI'JCR), so as to know their citing and cited patterns.

If they are to plan the allocation of resources for the development of their scientific programs however, LDC need to be aware of their scientific production and contribution.

In the biomedical field, The Panamerican Health Organization (PAHO) has initiated the implementation phase of a Latin American Health Literature Sciences database (LILACS) [6]. This project has urged every contributing country to analyse their national biomedical journals, so that under a common methodology, all of the Latin American biomedical literature be processed and disseminated throughout the region.

The purpose of this work is to present a quantitative analysis of the existing Mexican Biomedical Journals (MBMJ), so as to roughly measure the scientific contribution of Mexico in this field. An attempt has been made to compare the MBMJ with other Latin American/Caribbean Biomedical Journals (LABMJ).

Coverage by secondary sources of the MBMJ and LAMBJ will also be discussed, as well as a citation analysis of four LABMJ covered by Science Citation Index (SCI). Finally, a comparative analysis between LABMJ and articles published abroad by Latin American sources shall also be mentioned.

METHOD

In order to collect the MBMJ titles, the following procedures were taken : (1) a manual search was performed in the lists of journals included in *Excerpta Medica*, *Index Medicus*, *Index Medicus Latinoamericano*, Science Citation Index and Ulrich's International Guide to Periodicals; (2) an offline search was performed in MEDLARS' SERLINE database, this reported other MBMJ titles not included in Index Medicus nor MEDLINE, even ceased titles; and (3) browsing through local scientific journals, personal knowledge of the authors, and personal communications with editors and users.

Once the information about the journal titles was completed, an analysis of the last four issues of each journal was performed in order to select the MBMJ titles eligible for inclusion in the Mexican Biomedical Bibliography Database [7]. The methodology for such selection was that transfered by BIREME (PAHO's Latin American and Caribbean Health Information Centre, at Sao Paulo, Brazil) to all the participating countries in the LILACS implementation program. The selection process was performed by qualified staff at CENIDS (National Health Information and Documentation Centre) in Mexico City, for this Centre was appointed BIREME's National Coordination body in Mexico for the development of LILACS.

From the analysis of the selected journals, information was obtained regarding their type of editorial, frequency of publication and subject specialty (this was classified according to The National Library of Medicine' Subject Listing Headings [8]). A distinction between "completely" or "selectively" biomedical journals was also performed since not all journals selected were to be indexed "cover to cover" in the databases mentioned before.

In order to obtain a comparative framework of the MBMJ in the Latin American/ Caribbean region, a coverage analysis of the LABMJ by six secondary sources was performed. The sources selected were : (1) Index Medicus (IM); (2) Index Medicus Latinoamericano (IMLA); (3) Excerpta Medica (EM); (4) Science Citation Index (SCI); (5) Biological Abstracts (BA); and (6) Chemical Abstracts (CA). The first four were analysed through the "Lists of journals covered", and published annually by each source; and the last two were analysed through the

information given by 1987 Ulrich's International Guide to Journals.

SCI'JCR was used to obtain a comparative analysis regarding four LABMJ covered by SCI in 1987. These journals were : Archivos de Investigacion Medica (Mexico), Medicina (Argentina), Revista do Instituto de Medicina Tropical de Sao Paulo (Brazil), and Revista Medica de Chile (Chile). "Interciencia" (Venezuela) was discarded because it corresponded to a multidisciplinary subject category.

Finally, 1987 SCI was also used to obtain the corporate sources of Mexican and other Latin American authors or institutions who published abroad. This information was helpful to get a rough quantitative indicator of the amount of information published abroad, as compared to the one published nationally.

RESULTS

The Mexican Biomedical Journals (MBMJ)

67 journal titles were selected from a list of 150. The rejected titles came either from journals out of publication; Spanish translations of English language journals; or simply did not fit the inclusion methodology adopted (journals which lacked an editorial board, Bulletins with only short communications, news or short abstracts from books and journals).

The editorship of the 67 MBMJ came mainly from medical societies/academies (38.81 %), National Health Service institutions (28.35 %), and Universities (13.43 %). The rest was stratified among private institutions (11.94 %), national councils/foundations (4.48 %), and international organizations (2.99 %). Table 1 illustrates this distribution.

Table 1 : Mexican Biomedical Journals (MBMJ) by type of editorial

Type of editorial	Number of Journals	%
Medical Societies/Academies	26	38.81
National Health Service Institutions	19	28.35
Universities	9	13.43
Private Institutions	8	11.94
National Council for Sciences and Techn.	2	02.99
International Organizations	2	02.99
Foundations	1	01.49
TOTAL	67	100

The specialties covered by the 67 MBMJ represented 33 (18.33 %) of the 180 (100 %) Subject Listing Headings published in the 1988 List of Journals Indexed in Index Medicus. 16 (23.88 %) of the 67 MBMJ correspond to the subject "medicine"; 6 of which (37.5 %) were mainly research journals. The rest of the subject headings were covered each, by four or less than four journal titles. Table 2 describes the subject headings covered by the 67 MBMJ.

Table 2 : Subject headings covered by the Mexican Biomedical Journals

Subject heading	Number of journals*
Medicine (General medicine, including research)	16
Science	4
Public health	4
Cardiology	3
Obstetrics/Gynecology	3
Pediatrics	3
Biochemistry	2
Surgery	2
Psychiatry	2
Health services	2
Nutrition	2
Dentistry	2
Pathology	2
Anesthesiology	1
Allergy/Immunology	1
Dermatology	1
Pharmacology	1
Physiology	1
Gastroenterology	1
Critical care	1
Social Medicine	1
Microbiology	1
Respiratory tract diseases	1
Medical oncology	1
Ophthalmology	1
Orthopedics/Traumatology	1
Otolaryngology	1
Radiology	1
Rheumatology	1
Toxicology	1
Urology	1
Veterinary medicine	1
Nursing	1

* Every journal was classified according to its major subject content, thus, although one journal may cover more than one subject, that is not reflected here.

30 journals (44.78 %) were found to be published every three months; 20 (29.85 %) every two months; 10 (14.93 %) were published monthly; 5 (07.46 %) every four months; one (01.49 %) every to weeks; and one (01.49 %) annually. Of the last two, the former corresponded to the general "medicine" category, while the latter corresponded to the "public health" category. None of the research journals (under the "medicine" category) were found to be published on less than a bimonthly basis. Table 3 shows the frequency of publication of the MBMJ.

Table 3 : Mexican Biomedical Journals by frequency of publication

Journals published every :	Number of journals	%
Two weeks	1	01.49
Month	10	14.93
Two months	20	29.85
Three months	30	44.78
Four months	5	07.46
Year	1	01.49
TOTAL	67	100

MBMJ Included in Secondary Services

36 (53.73 %) of the 67 (100 %) MBMJ were included in six secondary services with the following distribution : 18 (26.87 %) in IMLA; 18 (26.87 %) in BA; 15 (22.39 %) in EM; 14 (20.90 %) in CA; 11 (16.42 %) in IM and 1 (01.49 %) in SCI. 31 journals (46.27 %) were not included in any of the above mentioned sources. 15 (48.39 %) of these journals corresponded to the "completely biomedical" category assigned by CENIDS. The remaining 16 (51.61 %) belonged to the "selectively indexed" category.

The distribution of the number of times a particular journal appeared in one or more than one secondary source was the following : 13 journals appeared only in one source; 15 journals in two sources; 2 journals in three sources; three journals in four sources; two journals in five sources and only one journal (Archivos de Investigacion Medica) appeared in all, six sources.

MBMJ in the Latin American/Caribbean Context

17 Latin American/Caribbean countries were found to be considered by the six secondary sources selected for this study. Table 4 describes the number of journals included in each secondary source per publishing country. A summary of this information indicates (as shown in Table 5) that IMLA ranks on top of the six sources since (a) it covers 44.85 % (235 journals) of the total number of journals represented in all six sources; and (b) it covers 16 of the 17 countries studied.

A rank by major to minor number of biomedical journals included in each source by publishing country, reported the following :

1. Brazil ranked No. 1 in all 6 sources.
2. Mexico ranked No. 2 in 5 sources (ranked No. 4 in IMLA).
3. Brazil, Mexico, Argentina, Chile and Venezuela ranked on the top five places in all six sources, the only exception being Chile in BA, where it ranked No. 7.
4. The top five ranks in each source represented the following percentages of the total (Latin American/Caribbean) biomedical journals covered : BA : 79.57 %, IMLA : 82.13 %, EM : 84.14 %, CA : 85.71 %, IM : 87.22 %, SCI : 100%.

5. Cuba ranked within the top five in three sources.
6. Colombia ranked No. 6 in three sources and No. 5 in one source.

Table 4 : Number of biomedical journals included in secondary sources, per publishing country

Country	Index medicus	Index medicus Lat.Am.	Excerpta medica	Biolog. Abstr.	Chem. Abstr.	Science citation index
Argentina	7	29	9	11	5	3
Brazil	15	110	31	34	19	3
Chile	5	14	6	3	5	3
Colombia		13	2	4	2	
Costa Rica	1	6	2	2		
Cuba	1	6	7	6	5	
Ecuador		2		2		
El Salvador		1				
Guatemala		1		1	1	
Jamaica	1	2	1			
Mexico	11	18	15	18	14	1
Panama	1	4				
Peru			1	3		
Puerto Rico	2	1	1			
Rep. Dominicana		2				
Uruguay		4		4	1	
Venezuela	3	22	7	5	4	1
TOTALS	47	235	82	93	56	11

Table 5 : Rank by higher Latin American Biomedical Journals coverage in six secondary sources

Rank	Secondary source	No. of journals	%	No. of countries*
1	Index Medicus Lat.Amer.	235	44.85	16
2	Biological Abstracts	93	17.75	12
3	Excerpta Medica	82	15.65	11
4	Chemical Abstracts	56	10.68	9
5	Index Medicus	47	08.97	10
6	Science Citation Index	11	02.10	5

* The total number of countries covered was 17.

Table 6 illustrates the rank by countries, whose biomedical journals are more broadly covered by the six secondary sources. Here we can see that the seven higher ranking countries (in descending order, Brazil, Mexico, Argentina, Venezuela, Chile, Cuba and Colombia) account for 91.04 % of the total LABMJ, as distributed in the six secondary sources.

Finally, it was interesting to find out that none of the biomedical journals (if any), as produced by the following countries, was represented in any of the six secondary sources : Belize, Bolivia, Haiti, Honduras, Nicaragua, Paraguay and Trinidad-Tobago.

Table 6 : Rank by countries whose biomedical journals are more broadly covered by six secondary sources

Rank	Country	Number of journals*	%
1	Brazil	212	40.46
2	Mexico	77	14.70
3	Argentina	64	12.21
4	Venezuela	42	8.02
5	Chile	36	6.87
6	Cuba	25	4.77
7	Colombia	21	4.01
8	Costa Rica	11	2.10
9	Uruguay	9	1.72
10	Panama	5	0.96
11	Peru	4	0.76
11	Puerto Rico	4	0.76
11	Jamaica	4	0.76
11	Ecuador	4	0.76
15	Guatemala	3	0.57
16	Rep. Dominicana	2	0.38
17	El Salvador	1	0.19
TOTALS : 17 countries		524	100

* One journal may be included in more than one secondary source; i.e., this cipher does not represent the total number of biomedical journals per country, but rather, the number of journals indexed per country in all, six secondary sources (Table 4 illustrates specific distributions, accordingly).

Citation Analysis of four Latin American Biomedical Journals

An analysis of the information retrieved from 1987 SCI, regarding four biomedical journals of four Latin American countries showed the following results:

1. Medicina (Argentina) ranked first in 1987 citations to all years, followed by Rev I Med Trop (Brazil), Rev Med Chile (Chile) and Arch Inv Med (Mexico).
2. The same pattern was found regarding the impact factors of these journals.
3. As for the immediacy indexes, Rev Med Chile (Chile) ranked first, followed by Medicina (Argentina), Arch Inv Med (Mexico) and Rev I Med Trop (Brazil).
4. Within their respective category, the following rankings were found to each journal : Medicina (Argentina) ranked 51, and Rev Med Chile (Chile) ranked 63, both classified under the "Medicine, General and Internal" category (Rank 1-68). Rev I Med Trop (Brazil) ranked 10 under the "Tropical Medicine" category (Rank 1-11) and Arch Inv Med (Mexico) ranked 41 under the "Medicine, Research and Experimental" category (Rank 1-41).
5. Self-citing rates of all four journals was between 3.24 % and 7.65 %; self-cited rates however, varied from 19.35 % (Arch Inv Med - Mexico -) to 73.01 % (Rev Med Chile).
6. The shortest citing half-life was found to be Medicina (Argentina) with 6.6 years and the longest citing half-life was for Arch Inv Med (Mexico) with >10 years.
   Table 7 illustrates the distribution of the results mentioned above.

Table 7 : Citation analysis of four Latin American Biomedical Journals (source : 1987 Science Citation Index)

Citation analysis	Medicina (Argentina)	Revista Medica de Chile (Chile)	Archivos de Investigacion Medica (Mexico)	Revista do Instituto de Medicina Trop. de Sao Paulo (Brazil)
Ranking in its category	51 (Rank 1-68 Medicine, General and Internal)	63 (Rank 1-68 Medicine, General and Internal)	41 (Rank 1-41 Medicine, Research and Experimental)	10 (Rank 1-11 Tropical Medicine)
Impact factor	0.372	0.162	0.111	0.254
Immediacy index	0.064	0.078	0.036	0.032
Citations in 1987 to all years	376	315	124	328
Self-citing rate	7.65%	7.15%	3.24%	5.63%
Self-cited rate	27.12%	73.01%	19.35%	22.86 %
Citing half-life	6.6	7.7	>10	8.9
Cited half-life	7.0	5.9	9.0	>10

7. In spite of the fact that the four LABMJ corresponded to three different categories in SCI, it was found that four journals (Lancet, Science, Am J Med and New Engl J Med) were cited six or more times by all four LABMJ in 1987. Other nine journals (Am J Trop Med Hyg, T Roy Soc Trop Med H, Cancer Res, Cancer, J Exp Med, Infect Immun, J Clin Endocr Metab, P Natl Acad Sci USA and Nature) were cited six or more times by three of the four LABMJ.
8. Excluding self-citing, Arch Inv Med (Mexico) did not cite any Mexican nor Latin American journal (at least six or more times) in 1987. 51.42 % of the articles cited in its 1987 references, were published in 1977 and earlier years. On the other hand, 35.48 % of 1987 citations of this journal were citations of older material published in 1977 and earlier years. These results corroborate the long citing/cited half-life of this journal.
9. Excluding self-citing : (a) Medicina (Argentina) cited eight times Rev I Med Trop (Brazil) in 1987; (b) Rev Med Chile (Chile) cited five chilean journals and two other Latin American journals, but did not cite any of the other three LABMJ considered in this study; and (c) Rev I Med Trop (Brazil) cited seven times Medicina (Argentina) in 1987, as well as other five Brazilian journals.
10. The cited patterns of the four LABMJ differed from the citing patterns mentioned above. Indeed, it was found that only three journals (T Roy Soc Trop Med H, Parasite Immunol and Exp Parasitol) cited both, Arch Inv Med (Mexico) and Rev I Med Trop (Brazil) in 1987, favouring the Brazilean journal (46 citations) over the Mexican journal (12 citations).

Rev I Med Trop (Brazil) was cited 23 times by two Brazilean journals. Excluding self-cited figures, Arch Inv Med (Mexico) and Rev Med Chile (Chile), were not highly cited by any national nor LABMJ. With the exception of the only seven citations received from Rev I Med Trop (Brazil) the same applied for Medicina (Argentina). Finally,

11. It was found that although the impact factors of the journals that cited the four LABMJ was variable, Arch Inv Med (Mexico) was cited by journals whose impact factors were higher than those citing the other three LABMJ. The journal that cited Arch Inv Med (Mexico) with the highest impact factor was Microbiol Rev (I.F. 14.19) and cited the mexican journal five times in 1987. On the other hand, Rev Med Chile (Chile) was cited by journals whose impact factors ranked between 2.02 and 0.16, thus representing the lowest impact factors of the journals citing any of the four LABMJ in this study.

Literature Drain of Latin American/Caribbean Publications

An analysis of the 1987 SCI'Corporate Sources to Latin American and Caribbean countries reported the following :

1. 23 Latin American/Caribbean countries contributed with 12,268 sources in 1987. This represented 1.97 % of the total SCI source items for that year.
2. Brazil (31.50 %), Argentina (26.26 %), Chile (15.19 %), Mexico (13.73 %) and Venezuela (4.75 %) represented 91.43 % of the total Latin American/ Caribbean contribution.
3. The countries that were not represented in the six secondary sources when analysing the biomedical journals, were indeed represented as science producing countries, exporting however, their findings to journals published outside the Latin American/Caribbean region.
   Table 8 gives a detailed distribution of contributing countries by number of sources.

DISCUSSIONS AND CONCLUSIONS

Considering the biomedical journal production, Mexico ranks a significant second place in the Latin American/Caribbean region, preceded only by Brazil. This production is reflected not only in the number of publishing journals, but also in its dissemination process throughout six major secondary services.

Apart from the quantitative analysis given in this work, it would be difficult to conclude at this time on the Mexican biomedical literature production as a whole, for only biomedical journals were studied. On the other hand, little is known about the Mexican end-user's attitudes towards information, as well as on the author's journal selection habits, and literature production sources in this country. In this respect, the following questions could be raised to mention but a few : Why is it that only nine biomedical journals come from University editorships, while there are over 50 medical schools in Mexico? Why do specialties like parasitology, family planning, and traditional medicine remain uncovered? Do public health journals cover these subject categories? There seems to be an overproduction of research work, as six journals were found under this subject category. 1983 statistics [9] reported 3821 national health research registries; however, there is no available information as to how many publications derived from such research work or where they were published. It is clear that much research needs to be performed on the Mexican user and producer of information, as he plays an important role in this information life-cycle.

Table 8 : 1987 Science Citation Index' corporate sources to Latin American and Caribbean authors

Rank	Country	Number of sources*	%
1	Brazil	3,864	31.50
2	Argentina	3,221	26.26
3	Chile	1,863	15.19
4	Mexico	1,685	13.73
5	Venezuela	583	4.75
6	Colombia	172	1.40
7	Cuba	135	1.10
7	Jamaica	135	1.10
9	Peru	109	0.89
10	Uruguay	97	0.79
11	Costa Rica	92	0.75
12	Panama	70	0.57
13	Guatemala	64	0.52
14	Trinidad-Tobago	60	0.49
15	Ecuador	40	0.33
16	Bolivia	22	0.18
17	Rep. Dominicana	15	0.12
17	Paraguay	15	0.12
19	Haiti	12	0.09
20	Nicaragua	10	0.08
21	El Salvador	2	0.02
22	Belize	1	0.01
22	Honduras	1	0.01
TOTALS : 23 countries		12,268	100

* Multidisciplinary. The total 1987 source items was 621,308.

In spite of the fact that BA and IMLA cover only 26.87 % of the total MBMJ, they are the major secondary sources to look for, when searching Mexican biomedical information. Furthermore, a search on Mexican biomedical literature in Index Medicus alone, would cover less journals than a search in BA, IMLA, EM or CA, alone.

The fact that only half (53.73 %) of the MBMJ were covered by the six secondary sources studied leads to conclude that 31 MBMJ are not known by the average user of these sources. This is a significant finding affecting the dissemination of Mexican biomedical information, for 15 (48.39 %) of such journals were regarded to be indexed by CENIDS on an in-depth basis. A proposal to include these titles in IMLA is highly recommended.

"Archivos de Investigacion Medica" is the only Mexican Journal that was covered by the six sources studied. It was interesting to find out however, that it does not only has a low self-citing/cited ratio as compared to the other LABMJ, but also, it does not cite any other Mexican nor Latin American journal on a considerable rate basis. This was found to be reciprocal since no Latin-American journal cited the Mexican Journal. According to Garfield [10]"... one might be tempted to assume that the Latin American authors are the least chauvinistic of the geographical groups so far studied (Russian, Franch, Japanese, and German). In view, however of the fact that they mostly publish elsewhere, one can conclude little of nationalistic import from the fact that they cite their own literature rarely". In this study it was found that Argentina, Brazil, and Chile did give and receive citations within the Latin American region; again, the only exception being the Mexican Journal.

Considering only the four LABMJ studied in SCI'JCR, Argentina leads on (1) impact factor; (2) citations received and (3) rank in its category. All these isolated results however, do not contribute to a broad assessment of the LABMJ. Further studies to other LABMJ need to be performed to conclude on the regional patterns of these journals.

The seven countries that highly represent the major LABMJ production (in descending order, Brazil, Mexico, Argentina, Chile, Venezuela, Cuba and Colombia) are also the leading contributing countries in the draining of Latin American publications abroad. Sandoval and Nunez [11] had previously reported in 1974, some findings on the drainage of biomedical manuscripts from Latin America. Some questions still remain : are more journals required in the region?, or the existing journals require more dissemination?, are authors forced to publish abroad to obtain a higher status/income?, are national policies forcing Latin American scientists to publish in journals indexed by "well known" secondary services?, Garfield's suggestion [10] twelve years ago of a Latin American journal printed in New York or Philadelphia would (still) be an adequate alternative?. All these questions shall remain unanswered until serious research be carried out at least, in the three higher ranking countries of the list, which, also happen to share the higher ranks in population, inflation and number of physicians in the Latin Amerian/Caribbean region.

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