

Original Article

Presence of Nuclear Medicine in the Spanish journals of Internal Medicine and other specialties (2000–2009)[☆]A. Durán-Ferreras^{a,*}, J. Sabaté-Díaz^b, M. Espigares-Jiménez^c^a Servicio de Medicina Nuclear, Hospital Universitario Virgen Macarena, Sevilla, Spain^b Departamento de Farmacología, Pediatría y Radiología, Universidad de Sevilla, Sevilla, Spain^c Centro de Salud Doña Mercedes, Dos Hermanas, Sevilla, Spain

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ABSTRACT

Objective: This article aims to provide a quantitative and qualitative description of the publications on Nuclear Medicine (NM) in journals from other disciplines, between 2000 and 2009.**Material and methods:** A retrospective descriptive study was carried out including the years 2000–2009 in three Internal Medicine (IM) journals and in three related specialty (RS) journals. The criteria used are that some of the authors were located professionally in a Service, Unit or Central MN and/or that the title of the article or at least its content made a reference to some specific aspect of NM. Date of publication, the magazine section, thematic, data of the authors, province and referral hospital were collected.**Results:** A total of 186 articles were found, 81 in IM journals and 105 in RS. The IM journal articles came from 43 different hospitals. Vall d'Hebron (Barcelona, Spain) was the hospital with the largest volume. Twenty-four provinces were identified, Barcelona and Madrid standing out among them with 20 and 17 articles, respectively. In the RS journals, 59 hospitals/centers had participated, Vall d'Hebron standing out with 51 articles. There were 9 foreign articles. The articles were distributed into 19 provinces, Barcelona and Madrid standing out with 32 papers and 20 papers, respectively.**Conclusions:** There are at least twice as many articles in the RS journals than in the IM ones. "Original" articles are the most frequent. The Clinical and Translational Oncology journal in RS and Medicina Clínica in IM stand out with the highest number of articles. No specific topic prevailed.

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Presencia de la Medicina Nuclear en revistas españolas de Medicina Interna y de otras especialidades (2000-2009)

RESUMEN

Objetivo: Describir cuantitativa y cualitativamente las publicaciones sobre Medicina Nuclear (MN) en revistas ajenas a la especialidad, entre los años 2000-2009.**Material y métodos:** Estudio descriptivo retrospectivo durante 2000-2009 en 3 revistas de Medicina Interna (MI) y en 3 de especialidades afines (EA). Los criterios utilizados son que algunos de los autores esté ubicado profesionalmente en un servicio, unidad o centro de MN y/o que el título del artículo o al menos su contenido haga alusión a algún aspecto específico de la MN. Se ha recogido la fecha de publicación, sección de la revista, temática, datos de autores, provincia y hospital de referencia.**Resultados:** Se han encontrado un total de 186 artículos, 81 en revistas de MI y 105 en EA. Los artículos de las revistas de MI se originaron en 43 hospitales/centros españoles. El de mayor producción fue Vall d'Hebron. Se han identificado 24 provincias, destacando Barcelona con 20 artículos y Madrid con 17. En las revistas de EA se hallaron 59 hospitales/centros, destacando el Vall d'Hebron con 21 artículos. Hay 9 artículos extranjeros. Se distribuyen en 19 provincias, destacando Barcelona con 32 trabajos y Madrid con 20.**Conclusiones:** Los trabajos en las revistas de EA duplican, al menos, los de las revistas de MI. Los «originales» son los más frecuentes. Destacan la revista Clinical and Translational Oncology en EA y Medicina Clínica en MI. No hay una temática que destaque. Barcelona y Madrid son las provincias más productivas. Por hospitales el Vall d'Hebron es el más productor.

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Introduction

The growth in scientific production has made it so that the vast quantity of new knowledge available cannot be easily managed, and consequently, the maximum potential benefits cannot be derived from it. Bibliometric studies have emerged to solve this situation.

These studies evaluate the production, circulation, consumption and repercussion of the publications studied.¹

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* Corresponding author.

E-mail address: andufe@gmail.com (A. Durán-Ferreras).

Table 1
Distribution of the studies published on Nuclear Medicine (NM) in the journals analyzed (2000–2009) with their corresponding ratios.

Journal	Issues published	Articles on NM	Ratios
Medicina Clínica	415	57	0.137
Revista Clínica Española	119	13	0.109
Anales de Medicina Interna	92	11	0.119
Revista Española de Cardiología	165	42	0.254
Endocrinología y Nutrición	120	31	0.258
Clinical and Translational Oncology	98	32	0.326
Total	1009	186	0.184

Bibliometric studies are useful not only for the researchers themselves but also to support the editors at the time of decision making and the study of the results of the scientific activity by reporting the characteristics of the investigation.^{2,3}

For many years the vast majority of scientific journals, whatever their subject area, have carried out their own bibliometric analyses. In Spain, the Spanish Journal of Nuclear Medicine and Molecular Imaging [Revista Española de Medicina Nuclear e Imagen Molecular (REMNM)] has also published 2 papers specifically devoted to this subject.^{4,5}

In all the previous cases these bibliometric studies have been focused on the journal itself; that is, the nature of the articles, their content, number of authors, etc. over a determined period of time have been analyzed. However, as pointed out in a specific investigation on Nuclear Medicine (NM), an important part of the work in this field has been published in journals other than this specialty.⁶

In Spain, the tendency is particularly to publish in journals of Internal Medicine (IM) or related specialties (RS), especially in those of Cardiology, Endocrinology and Nutrition and Medical Oncology. The aim of the present study was to quantitatively and qualitatively determine the publications related with NM in journals outside the specialty from 2000 to 2009.

Material and methods

We performed a descriptive, retrospective study during the period from 2000 to 2009 in 3 journals of IM (Medicina Clínica (Med Clin), Anales de Medicina Interna (An Med Interna), and Revista Clínica Española (Rev Clin Esp)) and in 3 of RS (Revista Española de Cardiología (Rev Esp Cardiol), Endocrinología y Nutrición (Endocrinol Nutr), and Clinical and Translational Oncology (Clin Transl Oncol)), seeking and analyzing the studies on NM (Table 1). The 3 journals of IM selected are those with the greatest impact in this specialty in Spain. The journals of RS represent the Spanish societies of these specialties which are the main solicitors of studies made in NM units.

The criteria used to select the studies were: some of the authors were professionally employed in a NM department, unit or center; and/or the title of the article or at least its content referred to some specific aspect of NM.

A total of 186 papers were found from which the following data were collected: date of publication, section of the journal in which the article appeared (Originals, Letters, Images, Review and/or Special articles, Clinical Notes, Editorials); content (PET-PET/CT, Sentinel Lymph Node, Nuclear Endocrinology, Nuclear Cardiology, Nuclear Neurology, Tumoral Biology and others); data of the authors (name, number and position of the physicians specialized in NM); province and hospital/center of origin of the articles.

The bibliometric search was made using the MEDLINE database, through the PubMed site, with the following filters: period (from January 1, 2000 to December 31, 2009), author and journal. The

search words used were: PET, SPECT, Isotopes, Scintigraphy, Technetium, Sentinel Lymph Node Biopsy, and Thallium.

Results

Table 1 shows the distribution of the articles on NM in the journals, with their corresponding ratios. The temporal evolution of the articles found in the IM and RS journals analyzed is shown in Table 2.

Table 3 reports the distribution of these same articles according to the section of the journal in which they appear. The form of distribution by the number of authors per article and by the best ordinal position of the authors is shown in Tables 4 and 5, respectively.

The 81 articles in IM journals were from 43 Spanish hospitals/centers, with the Hospital Vall d'Hebron, Hospital Clínico de Santiago, Fundación Jiménez Díaz, and Germans Trias i Pujol presenting the greatest production with 8, 7, 6 and 5 studies, respectively.

From the 105 articles published in journals of RS we identified 59 hospitals/centers of origin. Of note were the Hospital Vall d'Hebron (21 articles) followed by the hospitals/centers Clínico de Barcelona, do Meixoeiro, Ramón y Cajal, Clínico San Carlos, Infanta Cristina, Virgen de las Nieves, Clínico de Valencia and the Instituto Valenciano de Oncología with 3 studies each. We also found 9 articles from other countries, with 3 being from the United States.

With regard to localization by province, 24 were identified in the 81 studies published in journals of IM. Of note were Barcelona and Madrid, with 20 and 17 articles, respectively followed by La Coruña (7 articles), Granada (5), and Sevilla and Valencia with 4 each. One study was detected in each of the remaining provinces.

After excluding the 9 foreign articles, the 96 studies identified in journals of RS were found to have been produced in 19 provinces, with Barcelona (32 studies) followed by Madrid with 20 articles being of special note. Other provinces included Valencia with 8 articles, Alicante with 6, and Sevilla and La Coruña with 4 each. One study each was published in 10 other provinces.

Discussion

As mentioned in the section "Introduction", most medical journals have performed a bibliometric analysis of their activity. In these analyses the object of study was the journal itself and could therefore be qualified as internal. In contrast, scarce bibliometric analyses have studied a medical specialty whose visibility to the scientific community is made through journals alien to this specialty. This would imply an external analysis, which to date, in the case of NM, has not been done in our country. Nonetheless, it is only fair to point out that in one "Letter to the Editor" the authors stated that an important quantitative part of material published with aspects relevant to NM is disseminated in journals not related to the specialty.⁶ It could be argued that the best method to assess the diffusion of an investigative activity, in this case that of NM, is the Impact Factor (IF) of the journals analyzed. This method could not be applied in the present study because until the end of 2008 only 3 of the 6 journals analyzed (Med Clin, Rev Clin Esp and Rev Esp Cardiol) had obtained their IF.

As already mentioned 2 bibliometric studies on NM have been made in our country.^{4,5} The scarce difference of time between the publication of these two studies (5 years), and the fact of being equally descriptive and internal would a priori imply very similar results. In other words, the second study⁵ would be redundant. However, careful reading shows more differences than similarities.

The first difference of note is the period of time covered by each study: 10⁴ and 25⁵ years, respectively. Indeed, the temporal range

Table 2
Distribution by years of the articles in the journals analyzed.

Year	Med Clin	Rev Clin Esp	An Med Interna	Total	Rev Esp Cardiol	Endocrinol Nutr	Clin Transl Oncol	Total
2000	7	2	1	10	2	6	1	9
2001	3	5	0	8	2	3	1	6
2002	8	1	2	11	3	4	2	9
2003	6	0	3	9	5	1	2	8
2004	4	1	2	7	9	0	1	1
2005	9	2	2	13	2	3	5	10
2006	3	0	0	3	1	4	6	11
2007	6	1	1	8	3	4	5	12
2008	5	1	0	6	10	5	4	19
2009	6	0	0	6	5	1	5	11
Total	57	13	11	81	42	31	32	105

Table 3
Distribution by journal section of the articles in the journals analyzed in the study period (2000–2009).

Section	Med Clin	Rev Clin Esp	An Med Interna	Total	Rev Esp Cardiol	Endocrinol Nutr	Clin Transl Oncol	Total
Originals	24	3	3	30	12	7	10	29
Letters	17	2	4	23	3	3	1	7
Images	8	5	0	13	2	0	0	2
Review and/or special articles	4	0	0	4	14	9	10	33
Clinical notes	1	3	4	8	8	9	8	25
Editorials	3	0	0	3	3	3	3	9
Total	57	13	11	81	42	31	32	105

Table 4
Distribution by number of authors of the articles in the journals analyzed over the study period (2000–2009).

Number of authors	Med Clin	Rev Clin Esp	An Med Interna	Total	Rev Esp Cardiol	Endocrinol Nutr	Clin Transl Oncol	Total
1	5	0	0	5	2	2	4	8
2	6	2	1	9	9	3	1	13
3	10	2	3	15	4	7	2	13
4	14	3	1	18	8	3	3	14
5	2	1	1	4	1	1	4	6
6	9	0	2	11	7	7	0	14
7	3	4	1	8	1	4	5	10
8	3	0	0	3	0	0	3	3
9	2	1	2	5	4	1	3	8
≥10	3	0	0	3	6	3	6	15
Total	57	13	11	81	42	31	32	105

Table 5
Distribution according to the best ordinal positions of the specialists in Nuclear Medicine (NM) among the authors of the articles in the journals analyzed over the study period (2000–2009).

NM author position	Med Clin	Rev Clin Esp	An Med Interna	Total	Rev Esp Cardiol	Endocrinol Nutr	Clin Transl Oncol	Total
None ^a	14	4	4	22	12	10	15	37
First	22	1	4	31	4	7	7	18
Second	7	2	0	9	7	4	0	11
Third	6	1	2	9	8	5	5	18
Fourth	2	1	0	3	3	1	4	8
Fifth	2	0	1	3	4	2	0	6
Sixth	3	0	0	3	0	0	0	0
Seventh	0	0	0	0	2	0	1	3
Eighth or greater	1	0	0	1	2	2	0	4
Total	57	13	11	81	42	31	32	105

^a Studies of NM in which none of the authors is of the specialty.

of the second study allows a panoramic retrospective overview of what has been published in REMN since its foundation in 1982. A second difference was detected in the choice of items selected. There are logically some common items, but other aspects only appear in one study or the other such as, for example, the number of pages per article.⁴

However, the main difference between the two studies is the greater emphasis which the second⁵ gives to the Original articles. Indeed, the description is so detailed that it could be considered a monographic analysis of these articles.

With regard to comparison of the present study with these previous articles^{4,5} it is not surprising to find a sharing of items among the 3 studies (up to 6 of the total items analyzed), common items in the previous studies^{4,5} which have not been included in the present work (for example, the country in which the study was carried out, items shared by one or the other previous study⁵ and the present study (for example, the hospital in which the study was performed), and specific items of each study (for example, in our case, the position of the NM specialists in the order of appearance of the authors).

In the ratio shown in Table 1, which expresses the yield of the journals studied, the generalized inference of the preference for journals of IM among NM specialists to publish their investigations is overturned. As observed, neither together nor individually do these journals have an “inferior” yield to that of RS. The case of Med Clin is of special note, having the highest IF of the Spanish IM journals, with a much lower ratio than that of the journals of RS.

In the number of articles published each year we found that the total number is 25% higher in the RS journals than in those of IM. The evolution of this production is even more notable, falling over time in the IM journals and rising in those of RS. On assessing this parameter in the other studies^{4,5} a sustained increase was observed in the bibliographic production, being more irregular in the first, coinciding with our results. The greatest ratio and “impact” observed in the journals of Oncology in recent years (Table 2) is probably due to the introduction of PET into clinical practice.

The distribution of the studies according to the section of the journal shows that in those of IM the articles are mainly concentrated in 3 types, in decreasing order: Originals, Letters to the Editor and Images. The same is not found in the journals of RS in which the most frequent studies are: Clinical Notes, Originals and Review articles. On comparing these results with those of the previous studies^{4,5} they are clearly different, probably because their comparison is arguable considering that the present study is external versus the other 2 which were internal. Nevertheless, there is a notable coincidence, which is the numerical preponderance of the Original articles.

The content of the articles appearing in the IM journals shows a greater frequency of studies with PET-PET/CT and Nuclear Endocrinology. Logically, results were not obtained on this item in the journals of RS on including exclusive contents of each specialty considered. Thus, in the Rev Esp Cardiol all the NM studies are focused on Cardiology and the same occurs in the 2 remaining journals. This item was not contemplated as such in the previous studies, although it does appear under other names such as “Main subject”^{4,5} or “Technique used”⁴ thereby hindering comparison with our results.

The number of authors per study in both blocks of journals varied greatly. Nonetheless, in all the journals the number of 4 authors/study was the most frequent. These results are similar to those recognized in one of the previous studies,⁴ with this variable not having been quantified in the other.

The ordinal position most frequently held by the NM physicians in both types of journals was the “first”. Counter to this foreseeable fact another paradox is of note: the existence, also in both blocks of journals, of elevated values of “no” position. The explanation is

that these studies in which the NM specialists are absent have been performed by other specialists, with oncologists being of note. This item was not considered in the previous bibliometric studies.^{4,5}

According to geographic origin, the provinces of Barcelona and Madrid, in this order, headed the production of articles on NM. The same occurred in the journals of IM and RS, although the former had a larger number of provinces producing work. The most plausible explanation is the greater number of IM than RS departments present in all the hospitals, with the latter departments being absent in some.

The distribution per hospital/center in both the IM and RS journals demonstrates the preeminence of the Hospital Universitario Vall d’Hebron. This data is directly linked to the distribution of studies per province in which Barcelona is found to be the most productive. This parameter was only analyzed in one of the previous studies,⁵ although their results were discordant with those of the present study. It is hazardous to interpret this but the different periods of time studied in each should not be forgotten.

Conclusions

It can be concluded that the studies on NM in the journals analyzed are: relatively more frequent in those of RS, have had a progressive temporal growth, Originals predominate, no subject predominated over others, authorship was multiple, and the origin of the studies was more frequent in Barcelona and in the Hospital Vall d’Hebron.

Conflict of interest

The authors declare no conflict of interest.

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