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ORIGINAL

"REV INT MED CIENC AC". A BIBLIOMETRIC APPROACH TO THE 2000-2011 PERIOD

LA "REV. INT. MED. CIENC. ACT. FIS. DEP". UNA APROXIMACIÓN BIBLIOMÉTRICA DEL PERIODO 2000-2011

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ABSTRACT

The International Journal of Medicine and Science of Physical Activity and Sport is a Spanish journal indexed in the two most important databases globally, with which impact indexes are calculated: Web of Science and Scopus. The present study analyses bibliometrically this journal from its appearance until 2011. A total of 287 articles were published, with an average of 2.8 authorships per article. We can conclude that it is one of the best journals in Spanish dealing with sports sciences and that the articles published in this primary source enjoy excellent visibility. Likewise, in light of the results, possible improvement actions are suggested: increasing the amount of articles per number, increasing the

percentage of women and the internationality of the members of the different Boards of the journal, and offering the possibility that researchers that do not speak Spanish may publish their articles in English only.

KEYWORDS: Bibliometry, scientometrics, assessment and quality, scientific journals, bibliographic production, internationality, gender.

RESUMEN

La Revista Internacional de Ciencias de la Actividad Física y del Deporte es una revista española indexada en las dos bases de datos más importantes a nivel internacional sobre las que se calculan los índices de impacto: Web of Science y Scopus. El presente trabajo analiza bibliométricamente esta revista desde su nacimiento hasta el año 2011. En total se publicaron 287 artículos, con un promedio de 2,8 autorías por trabajo. Se concluye que es una de las mejores revistas en lengua española de ciencias del deporte y que los trabajos publicados en esta fuente primaria optan a una excelente visibilidad. Asimismo, en virtud de los resultados, se argumentan posibles acciones de mejora: aumentar el número de artículos por número, incrementar el porcentaje de mujeres y la internacionalidad de los miembros de los distintos Consejos de la revista, y ofrecer la posibilidad de que los investigadores que no hablen español puedan publicar sus artículos exclusivamente en inglés.

PALABRAS CLAVE: Bibliometría, cienciometría, evaluación y calidad, revistas científicas, producción bibliográfica, internacionalidad, género.

INTRODUCTION

Physical Activity and Sport is a scientific knowledge area, and as such employs scientific journals to publicize and broadcast its findings. A journal of physical activity and sports sciences of massive importance in the Spanish language, as it publishes its articles in this language in all cases, —although, especially from 2012 onwards, also in English—, is the International Journal of Medicine and Science of Physical Activity and Sport (from now on, RIMCAFD). This journal is also denominated “Rev. Int. Med. Cienc. Act. Fis. Dep.”, in the case of the International Organization for Standardization (ISO), or “Rev Int Med Cienc Ac”, in the case of the Journal Citation Reports (JCR) database. The first issue of the journal was published in November 2000, and has been an exclusively electronic publication ever since.

In this regard, a remarkable aspect of the RIMCAFD is the open nature of this primary source, as it can be accessed without cost on the Internet. It is, therefore, several years ahead of other initiatives in favour of open access to scientific knowledge, such as the Budapest Declaration (BOAI, 2002). This is not its only accolade, as the journal passed in 2011 the demanding process of scientific journals assessment of the Spanish Science and Technology

Foundation (FECYT) (Spanish Repository of Science and Technology, 2011). The prestigious database JCR, for its part, includes only two Spanish publications related to physical activity and sport. One of them is the *Revista de Psicología del Deporte* journal, labelled in the knowledge area *Applied Psychology* (Social Sciences Edition); the other is the RIMCAFD, the only Spanish source in the *Sport Sciences* (Science Edition) area (Web of Knowledge, 2012). It is true that there are other journals included in the JCR database that publish articles on sports sciences (Reverter-Masià, Hernández-González, Jové-Deltell and Blanco-Felip, 2011), but that is not the primary subject of those publications, as they are included in knowledge areas that may be considered related to physical activity.

Regardless of the knowledge area, the quality of scientific journals is achieved usually by means of a process of selection of the articles published (Luis-Pascual, 2011). That implies, to say the least, assessing a set of factors related to the relevance and innovation of the article's contents and the correct methodology of the process by which that knowledge was acquired, as well as an adequate written style (Bosch, López and Vallés, 2001). Obviously, not all articles have the same quality or contribute in an equal manner to scientific advancement, and not all journals reach the same level of excellence.

The article assessment process of a scientific journal must be rigorous and undertaken by experts of prestige in the field of study of the research done. In this regard, one of the proceedings to assess the quality of the journals is a *panel of experts*. Although some authors have criticized the subjective character and the cost that this proceeding implies (Dorta-González and Dorta-González, 2011), it has nonetheless been used in prestigious assessment processes such as the one employed by the FECYT (Spanish Repository of Science and Technology, 2011). Furthermore, also with the aim of analysing the quality of these journals, *indexes or bibliometric indicators* are used; they are measurements that facilitate the study and research of scientific activities (including quality indexes such as the impact factor or index, the position the journal occupies in its category, the number of quotes received, as well as quality indicators, such as the journal's formal criteria, informative quality criteria, or broadcast and visibility criteria). These indicators help to be aware, for instance, of the work that is being undertaken in a given field of knowledge, the trajectory of the articles, or the relationships between different fields of knowledge (Buela-Casal, Carretero-Dios and de los Santos-Roig, 2002; Rueda-Clausen, Villa-Roel and Rueda-Clausen, 2005). These indexes, to sum up, may help to identify readers' tendencies, —who are often also authors of other articles—, which allows inferring the relevance of the research, its usefulness or applicability, as well as its availability or accessibility (González de Dios and Moya, 1997). However, in spite of all this (itself a controversial issue), there is no unanimous consensus either regarding the validity of bibliometric indicators as a valid expression or measurement of the researchers' professional trajectory (Buela-Casal, 2003; Dorta-González and Dorta-González, 2011; González de Dios and Moya, 1997).

In any case, a line of research that has been underway for some time is the analysis of the quality of scientific journals by means of bibliometric indicators, be it by comparing a given journal with other journals that deal with similar subjects or of the same discipline (Buela-Casal et al., 2002; Villamón, Job, Valenciano and Devís, 2012), or by longitudinal bibliometric studies of the same journal (Aliaga and Suárez-Rodríguez, 2007; Arbinaga, Aragón and Tejedor, 2010; González, Valderrama, Aleixandre and González, 2011). Amongst Spanish studies related to Physical Activity and Sport, the work developed during the last decade by the research group of la Universitat de València stands out, group coordinated by José Devís-Devís (Devís-Devís, Antolín, Villamón, Moreno and Valenciano-Valcárcel, 2003; Devís-Devís, Valenciano-Valcárcel, Villamón and Pérez-Samaniego, 2010; Devís-Devís, Villamón, Izquierdo-Herrera and Valenciano-Valcárcel, 2011; Valenciano, Villamón and Devís, 2008; Valenciano-Valcárcel, Devís-Devís and Villamón, 2010), as well as other one-off studies worth taking into account (Luis-Pascual, 2011; Reverter-Masià et al., 2011). However, there isn't any specific bibliometric study about the RIMCAFD, which might prove useful for a prestigious journal that is hopefully willing to improve its national and international positioning and its repercussion.

That is why, for these reasons and in the opinion of the authors, a bibliometric approach to the indexes and indicators of the RIMCAFD would be a subject worth of study. This study, specifically, is articulated around three goals: to describe the evolution of the scientific production of this primary source; to analyse its international character; and to know more about the equal-gender structure of the different collegiate bodies that make up the journal.

METHOD

Design and analysis unit

The study follows a descriptive design by means of document analysis. In order to know the longitudinal bibliometric indexes 287 articles were analysed, published from November 2000 (RIMCAFD #1) until December 2011 (#44). To know the transversal bibliometric indexes, the first issue of 2012 was used (march, #45), which, in opinion of the authors, expressed the consolidation of the bibliometric indexes up until 2011.

Proceeding and indicators

The data were obtained through Internet, by accessing the main page or *website* of the journal: <http://cdeporte.rediris.es/revista/revista.html>. Two evaluators, previously trained in documentary analysis, categorized separately each of the bibliometric indexes. The data are highly reliable: a Kappa agreement index of 0.96 ($p < 0.0001$) was obtained between both evaluators, and in the few cases where there was disagreements these were solved jointly by both evaluators.

In order to know the evolution of the scientific production of the journal three indicators were studied: amount of articles, amount of authors and average number of authors per article; all three indicators were studied longitudinally year after year. To analyse the international character of the journal five indicators were studied: indexing in databases, international character of the Scientific and Advising Board, international character of the Editorial and Publishing Board, international character of external evaluators and the multinational authorship obtained through the institutional affiliation of the first author. Finally, with the goal of analysing the gender-equal structure of the different collegiated bodies that make up the journal only one indicator was studied: men and women quotas in the RIMCAFD Boards and the evaluators team.

The data were analysed by means of frequencies statistic descriptive. Correlational statistics were also applied. The reliability level obtained was 95% ($p < 0.05$). The IBM SPSS Statistics 20 computer program was used.

RESULTS

Scientific production

From 2000 to 2011, the RIMCAFD published a total of 287 articles, with a total of 810 authorships or signatures (this piece of info cannot be considered equal to the amount of different authors, as some of them took part in several articles during the period studied). Likewise, if we take the *number of authorships per article* to be a divisible unit, an average of 2.8 authorships per article was found for this period (Table 1).

TABLE 1. Scientific production of the RIMCAFD, 2000-2011.

Year	Number of issues	Number of articles	Number of authorships	Average authorship/article
2000	1	5	12	2.4
2001	2	10	25	2.5
2002	5	24	42	1.75
2003	4	20	37	1.85
2004	4	19	44	2.31
2005	4	22	64	2.9
2006	4	21	50	2.38
2007	4	28	86	3.07
2008	4	22	70	3.18
2009	4	28	83	2.96
2010	4	40	135	3.37
2011	4	48	161	3.35
Total	44	287	810	2.8

There is also growth between the years of evolution of the journal and the number of articles published. This growth is better adjusted to a linear relationship ($R^2=0.77$; $p<0.0001$) than to an exponential relationship ($R^2=0.71$; $p<0.0001$) (Figure 1).

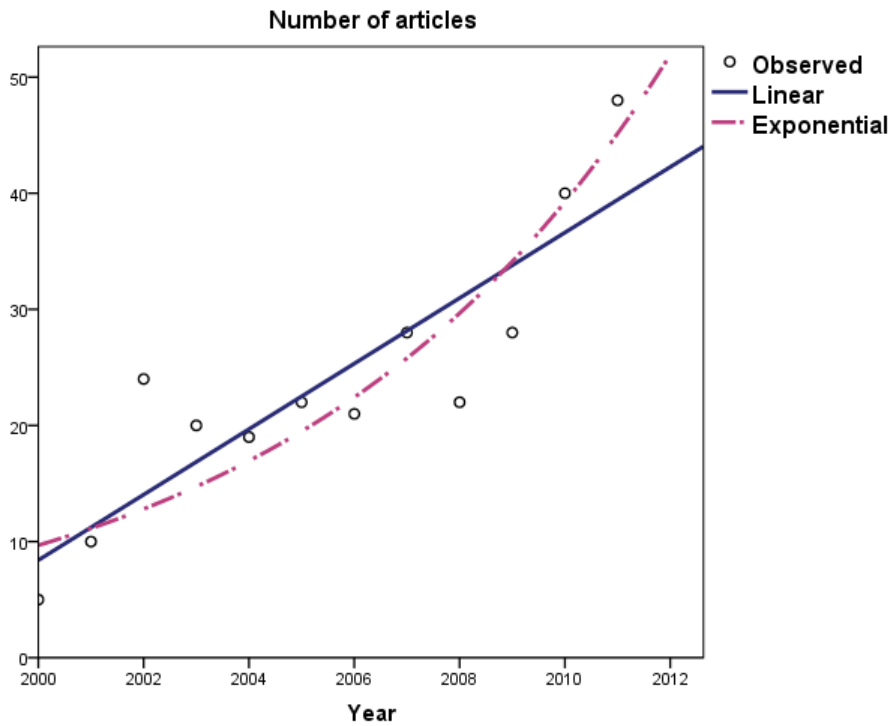


FIGURE 1: Evolution of the number of articles, 2000-2011 period.

Consistently with the previous result, there is also an increase in the number of authorships between 2000 and 2011, a relationship particularly exponential ($R^2=0.88$; $p<0.0001$) as opposed to a linear relationship ($R^2=0.84$; $p<0.0001$) (Figure 2).

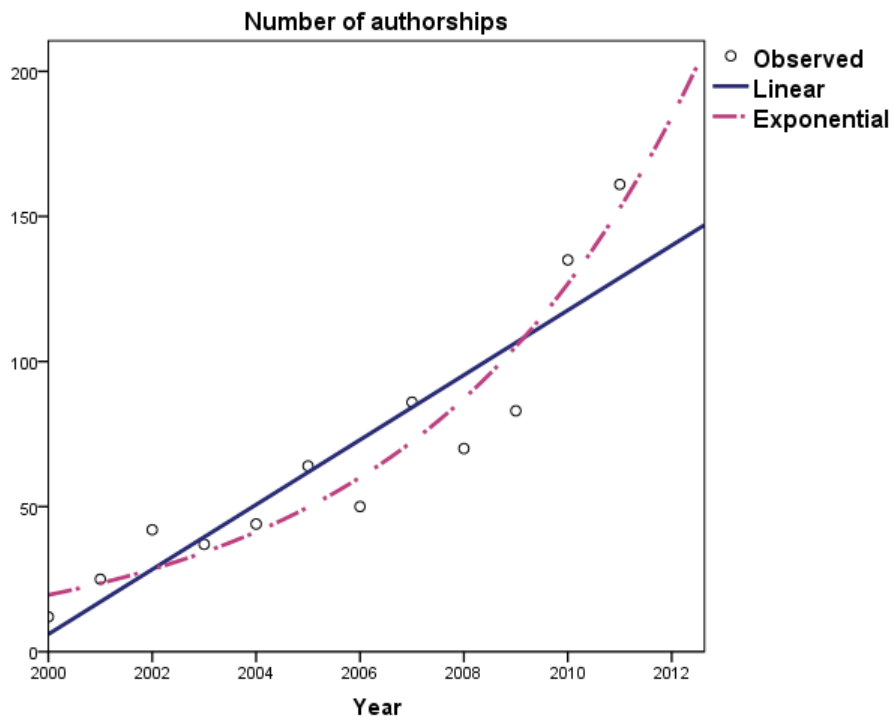


FIGURE 2: Evolution of the number of authorships, 2000-2011 period.

Also, the number of authorships per article has increased from 2.4 in 2000 to 3.3 in 2011. It can be observed that it is a linear ($R^2=0.64$; $p<0.0001$) rather than exponential relationship ($R^2=0.59$; $p<0.0001$) (Figure 3).

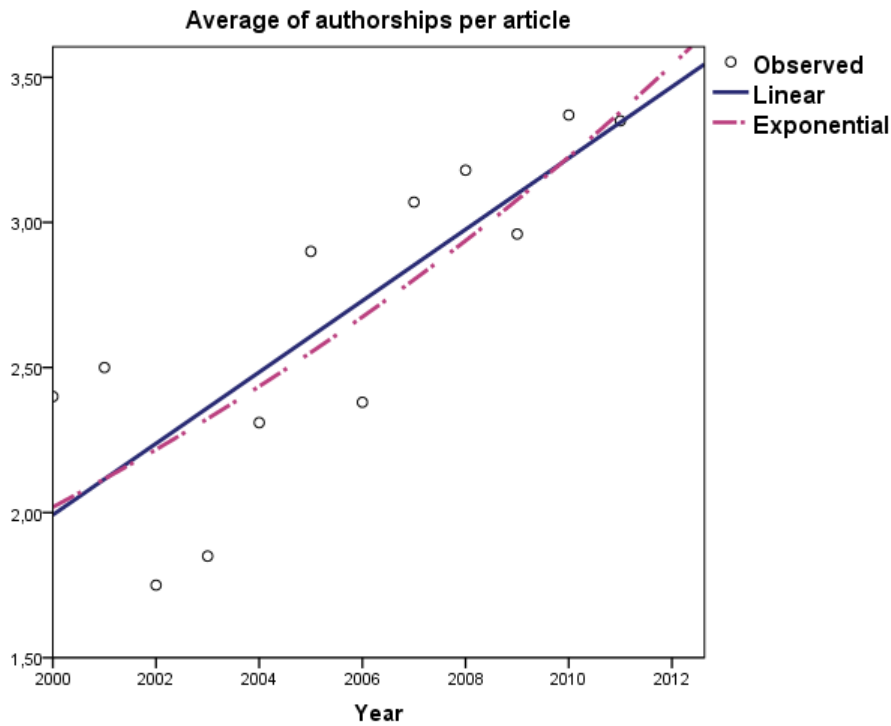


FIGURE 3: Evolution of the average of authorships per article, 2000-2011 period.

RIMCAFD internationalization

As of today, the RIMCAFD is indexed in three bibliometric databases used as basis for the calculation of the impact factor, two of which are international, and the other of a national nature (Table 2).

TABLE 2. RIMCAFD indexing: Internationalization in source databases for the calculation of the impact index.

DATABASES WITH IMPACT INDEX	
SPANISH	INTERNATIONAL
IN-RECS	Web of Science
	Scopus
1 (33%)	Total = 2 (67%)

RIMCAFD is also present in another 16 databases or catalogues, half of them international (Table 3).

TABLE 3. RIMCAFD indexing: Internationalization in other databases or catalogues.

OTHER DATABASES, CATALOGUES OR DIRECTORIES	
SPANISH	INTERNATIONAL
Dialnet	DOAJ, Directory of Open Access Journals
Revicien	Latindex
Recolecta	E-revistas
Dulcinea	RedALyC
RECYT	Scirus
DICE	Genamics
ISOC	Heracles
CIRC	Biblioteca virtual en salud
Total = 8 (50%)	Total = 8 (50%)

The RIMCAFD's Scientific and Advising Board is composed by a total of 28 members. When we looked at these members' institutional affiliations, we found that 64.2% of them are Spanish and 35.8% are from other countries; specifically, 14.2% from Portugal, 7.2% from France, 7.2% from the United States of America, 3.6% from Belgium and 3.6% from Cuba (Table 4).

TABLE 4. RIMCAFD internationalization: Scientific and Advising Board.

SCIENTIFIC AND ADVISING BOARD						
SPAIN			OTHER COUNTRIES			
Institution	N	%	Institution	N	%	
Agencia Estatal Antidopaje	2	7.1	Universidade Técnica de Lisboa (Portugal)	3	10.6	
Comité Olímpico Español	2	7.1	Universidade do Porto (Portugal)	1	3.6	
Universidad Complutense de Madrid	2	7.1	Université de la Sorbonne (France)	1	3.6	
Universidad de Alcalá de Henares	2	7.1	Université de Reims (France)	1	3.6	
Universidad de Valencia	2	7.1	University of Northern Colorado (USA)	1	3.6	
Universidad del País Vasco	2	7.1	H2O's Foundation d/b/a SWIM GYM (USA)	1	3.6	
Centro Médico Deportivo Oberón	1	3.6	Université de Liège (Belgique)	1	3.6	
Universidad Autónoma de Madrid	1	3.6	Instituto Manuel Fajardo (Cuba)	1	3.6	
Universidad de Castilla-La Mancha	1	3.6				
Universidad de Oviedo	1	3.6				
Universidad de Sevilla	1	3.6				
Universidad de Valladolid	1	3.6				
TOTAL	N=18	64.2%	TOTAL	N=10	35.8%	

The RIMCAFD's Editorial and Publishing Board is composed by a total of 20 persons, 18 of them Spanish (90%), one Mexican (5%) and another one from the UK (5%) (data inferred through institutional affiliation) (Table 5).

TABLE 5. RIMCAFD internationalization: Editorial and Publishing Board.

EDITORIAL AND PUBLISHING BOARD					
SPAIN			OTHER COUNTRIES		
Institution	N	%	Institution	N	%
Universidad Autónoma de Madrid	7	35%	ITESO (México)	1	5%
Universidad de Murcia	2	10%	University of Greenwich (UK)	1	5%
Universidad Autónoma de Barcelona	1	5%			
Universidad Complutense de Madrid	1	5%			
Universidad de Almería	1	5%			
Universidad de Córdoba	1	5%			
Universidad de Extremadura	1	5%			
Universidad de Las Palmas de Gran Canaria	1	5%			
Universidad de Sevilla	1	5%			
Universidad de Vigo	1	5%			
Universidad de Zaragoza	1	5%			
TOTAL	N=18	90%	TOTAL	N=2	10%

Furthermore, the RIMCAFD has 77 evaluators, all of which, except one from la Universidad de Caxias do Sul (Brazil), are Spanish. These evaluators belong to Universities or Institutions from 12 Spanish Autonomous Communities, although 44% of them (n=34) belong to the Autonomous Community of Madrid (Table 6).

TABLE 6. RIMCAFD internationalization: External evaluators.

EXTERNAL EVALUATORS					
SPAIN			OTHER COUNTRIES		
Autonomous Communities	N	%	Institution	N	%
Madrid	34	44.1	Universidade de Caxias do Sul (Brazil)	1	1.3
Andalucía	9	11.7			
Castilla y León	7	9.1			
Cataluña	5	6.5			
Galicia	4	5.2			
Asturias	3	3.9			
Canarias	3	3.9			
Valencia	3	3.9			
Castilla-La Mancha	2	2.6			
Extremadura	2	2.6			
Murcia	2	2.6			
Aragón	1	1.3			
Baleares	1	1.3			
TOTAL	N=76	98.7%	TOTAL	N=1	1.3%

Finally, taking into account the institutional nationality of the first author of each article, the RIMCAFD has published articles with authorships from 11 different countries. 83% of them are articles with authorships belonging to Spanish institutions. Cuba and Argentina have a production of nearly 5% and 2% respectively (Table 7).

TABLE 7. Authorships' nationalities.

	Frequency	Percentage
Spain	239	83.3
Cuba	14	4.9
Argentina	6	2.1
Brazil	5	1.7
Mexico	5	1.7
Chile	4	1.4
Colombia	2	0.7
Portugal	2	0.7
Qatar	1	0.3
Costa Rica	1	0.3
Venezuela	1	0.3
Undetermined	7	2.4
Total	287	100

Gender distribution of the editorial staff

In global terms, nearly 80% of the RIMCAFD editorial staff are men. An editorial policy imbalance that prevails in the different collectives: Scientific and Advising Board, 96% men; Editorial and Publishing Board, 75% men; team of evaluators, 75% men. The management team is composed by a male Director and a female Deputy Director (Table 8).

TABLE 8. Gender distribution of the editorial staff.

Year	QUOTAS BY GENDER				Total section	
	Man		Woman		N	%
	N	%	N	%		
Managing team: Director and Deputy Director	1	50%	1	50%	2	100%
Scientific and Advising Board	27	96%	1	4%	28	100%
Editorial and Publishing Board	15	75%	5	25%	20	100%
Team of evaluators	58	75%	19	25%	77	100%
TOTAL	101	79.5%	26	20.5%	127	100%

DISCUSSION AND CONCLUSIONS

The RIMCAFD is an open-access, multidisciplinary scientific journal in the field of sports sciences, with a clear international character. The diachronic evolution of the scientific production of the journal, with a total of 287 articles published in the 2000-2011 period, shows a linear growth that can be accounted for basically due to the fact that in its first year only one issue was published, two were published in the second, five in the third and only in the fourth year did it reach stability and quarterly periodicity. The analysis of the data reflects an acute growth in the number of articles starting from 2010, when for the first time it is indexed in JCR. Likewise, the total number of authorships by year that have published during 2000-2011 shows a clear growth, from 12 authorships or signatures in the first year of this period to 161 in the last one.

On the other hand, the average of authors per article during the lifetime of the journal is 2.8, which places it in a common average of between two and three authors per article as the IN-RECS index data shows for Spanish Education journals, which includes the RIMCAFD and the rest of Spanish Physical Activity and Sports national journals (IN-RECS, 2009). Not until 2007 do we find an annual average of more than three authors per article, a quantity that has remained unchanged up until now with barely any variations. The growth, more linear than exponential, in the number of authors per article, may be related to the possible penalty applied by research activities' evaluating agencies when a high amount of signatories is not justified by the subject, complexity or length of the articles.

Regarding the RIMCAFD internationalization, the indexing data from databases prove that it is a journal with a high visibility, and presence in several catalogues, repertoires and databases, both bibliometric and bibliographic. In this regard, the journal is present in the two most important databases at a global level: Web of Science and Scopus, and it is also present in 16 other databases or catalogues, of which 50% are international. If these results are contrasted with the indexing profiles of other physical activity and sport journals (Luis-Pascual, 2011; Martínez, 2011; Olivera, 2011), we can conclude that the RIMCAFD enjoys an extremely high dissemination.

The internationality level of the Boards, both the Scientific and Advising Board and the Editorial and Publishing Board, reflect on the contrary a mostly local composition. In the Scientific and Advising Board, 78% of its members belong to Iberian institutions, and Spaniards are evenly spread between one and two members in 12 bodies belonging to nine universities, two state bodies and one medical centre. The composition of the Editorial Board and Publishing Committee has a lower degree of internationality: 90% of its members are Spanish, and for external evaluators only 1.3% of its members are not Spanish nationals. The analysis of the institutional nationality of the first author of each article provides better results, with the presence of authorships from 11 different countries. However, 83% of the authors belong to national institutions.

Taking into account that this is an international journal, as its own name implies, data shows that in spite of the good visibility of the RIMCAFD, a greater external openness of all journal boards is needed, as well as the publication of articles belonging to authors whose mother tongue is not Spanish. We believe that the publication, especially from 2012 onwards but also in a retroactive basis, of articles that must be written both in English and Spanish, will help in this regard.

Regarding the distribution by gender of the editorial staff, there is a clear imbalance between men and women, due to the fact that almost 80% of the different Board members are male. If we compare these results with the last poll of the National Institute for Statistics about human resources on science and technology (INE, 2010) with 2009 data, in which the presence of male and female doctor researchers is close to parity, with amounts of 53% and 47% men in Social Sciences and Medical Sciences respectively, we conclude that the high quantity of males in the journal's Boards is far from a gender equality situation.

In opinion of the authors and evaluating globally the contents of this study, we may conclude that the RIMCAFD is currently one of the best physical activity and sports sciences journals in Spanish, although judging by the bibliometric data analysed here it should improve by increasing the number of articles per issue. For instance, if we compare the data of the studies published until 2011 (287 articles) with the number of studies approved pending of publication at the date this study was closed (65 articles), it would be advisable to increase the number of articles per each issue published, and that should not affect at all its periodicity, although it might jeopardize, provisionally, impact indexes. Furthermore, we consider it convenient to open the Boards of the journal to other nationalities besides Spanish, to increase the presence of women in those Boards to achieve parity, and to promote the publication of articles from authors that do not write in Spanish but in English.

Also, the inclusion of the RIMCAFD in JCR and other databases adds a new function to the traditional one of publishing as an instrument of the scientific community, namely a function related to the assessing processes of research activities done by national bodies such as the National Assessment Commission on Research Activities (CNEAI) or the National Quality Assessment and Accreditation Agency (ANECA), whose criteria for a positive evaluation of research activities include contributions of scientists in journals of prestige and proven influence. In opinion of the authors, this is another contribution of the RIMCAFD to the scientific community.

Finally, it is worth recognizing the limitations of this bibliometric approach study, which include, among others: it presents an analysis of the development of the RIMCAFD since its beginning until 2011, but its indicators are not compared to those of other journals; not having informed of the subject matter of the articles (as the journal includes a section where all articles are classified according to the Council of Europe's thematic index); the fact that we assigned the

nationality of contributions taking into account the first author only; or the fact that the study might be extended to other indexes such as, for instance, authors with a greater amount of published articles, or classical studies on the fine-tuning of bibliometric laws. It seems logical, therefore, to consider all these a possible research objective for the future.

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