Scientific production on the evaluation of the quality of eating disorder websites, indexed in international databases.

Producción científica indizada en bases de datos internacionales, sobre la evaluación de la calidad de los Websites sobre trastornos de la conducta alimentaria.

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Resumen

Análisis bibliométrico de los estudios sobre la calidad de los sitios Web sobre trastornos de la conducta alimentaria. Se consideraron adecuados los descriptores *Eating Disorders* (que incluye la anorexia nerviosa y bulimia nerviosa) e Internet. Se estudiaron 190 publicaciones; identificándose 111 instituciones en los estudios publicados en 112 revistas; contabilizándose un total de 603 firmantes. La edad media de los artículos fue $3,98 \pm 0,18$ años (IC95% 3,63 a 4,34), la tasa de obsolescencia de 3 años y el Índice de Price del 38,95%. Se observó diferencias significativas en la recuperación de la información entre los períodos de 1997 a 2004 y de 2004 a 2009, chi-cuadrado 11,43 (g.l. = 1, $p < 0,001$). Así como en el acceso al texto original entre las diferentes bases de datos, chi-cuadrado 22,23 (g.l. = 4, $p < 0,001$). En conclusión: hay una gran difusión institucional sin grandes productores y los artículos muestran un bajo índice de colaboración, aunque el tema es de gran actualidad.

Palabras clave (MeSH):

Trastornos de la conducta alimentaria, Internet, Bibliometría, Control de calidad, Mecanismos de Evaluación de la Atención de Salud.

Abstract

Bibliometric analysis of studies on the quality of eating disorder websites. The descriptors *Eating Disorders* (which includes *Anorexia Nervosa* and *Bulimia Nervosa*) and the Internet were considered to be adequate. The results were: 190 publications were studied. 111 institutions were identified with studies published in 112 journals. A total of 603 signatories were counted. The average age of the articles was 3.98 ± 0.18 years (CI95% $3.63 - 4.34$), the obsolescence rate was 3 years and the Price Index was 38.95%. There are significant differences in information retrieval between the periods of 1997 to 2004 and from 2004 to 2009, Pearson's chi-square 11.43 (d.f.=1; p<0.001). As well as in access to the original source between the different databases, Pearson's chi-square 22.23 (d.f.=4; p<0.001). In conclusion: There is a large institutional spread without major producers and the articles show a low index of collaboration, even though the subject matter is very topical.

Keywords (MeSH): Eating Disorders, Internet, Bibliometrics, Quality Control, Health Care Evaluation Mechanisms.

Introduction

It is well known that one of the main uses of the Internet is as source of information on health related topics. In this regard, a study carried out in 2000 concluded that of the total number of people who have access to the Internet in their house, more than half were using it for this purpose (Mollyann, Flournoy, Altman, Blendon, Benson & Rosenbaum, 2000. Furthermore, the Internet has become the most important method of communication and expression within the adolescent population (Asociación para la investigación de medios de comunicación, 2009).

Thus, this use of the Internet is sometimes associated with a potential risk, given that it facilitates access to data on a wide variety of biomedical issues, including of course Eating Disorders (ED) (Norris, Boydell, Pinhas & Katzman, 2006). In fact, there are a wide range of websites on this topic, from support and pro-recovery websites to those which support anorexia and bulimia nervosa; more commonly known as pro-ana and pro-mia websites. The visiting of these websites merits particular attention because an adolescent with little experience could easily find them using basic search engines or come across them by chance whilst browsing the links on this topic (Wilson, Peebles, Hardy & Litt, 2006).

However, the issue of pro-ED websites appears to be relatively unexplored by researchers. Even by professionals who support the diffusion of this information via the Internet and who believe that done in the right way the diffusion of this information has beneficial effects, and are concerned about how the behaviour related to Eating Disorders is often propagated (Csipke & Horne, 2007).

As a result, it is necessary to conduct an in-depth analysis of the findings of these existing studies on the quality of these websites, which are within everybody's reach,

and to keep up-to-date with the background information which will serve as a basis for future studies on this important issue (Murphy, Frost, Webster & Schmidt, 2004).

In order to do this we must make use of bibliometric analysis; this metric analysis allows us to identify and evaluate scientific production in one area of knowledge, it forms part of the social study of science and one of its main applications is in the area of scientific policy, providing useful tools for expert review processes of research activity findings (Guilera, Gómez & Hidalgo, 2006; Sanz-Valero & Wanden-Berghe, 2009; Van Raan, 2005).

Thus, taking into consideration the great interest in and the importance of ascertaining how the quality of ED websites has been studied we think it is pertinent to establish who, where, and what has been carried out up until now on this subject in the scientific community. Therefore the aim of this study is to determine, distinguish and analyse, by means of bibliometric analysis, studies focusing on the quality of eating disorder websites.

Method

Study design: Observational, descriptive and cross-sectional study, by means of bibliometric analysis, of the scientific production indexed in international databases, on the quality of ED websites.

Sources for the collection of data: The data was obtained by online consultation of the references obtained from the bibliographical databases MEDLINE (through PubMed), PsycINFO, The Cochrane Library, EMBASE, ISI Web of Knowledge, LILACS and Psicodoc.

Through examination of the Thesaurus of the U.S. National Library of Medicine (Medical Subject Heading Terms, MeSH) and that of the American Psychological

Association (Psychological Index Terms) the following Descriptors were identified and considered to be appropriate:

Eating Disorders: a group of disorders characterized by physiological and psychological disturbances in appetite or food intake. Including Anemia Nervosa and Bulimia Nervosa as dependent Descriptors.

Internet: a loose confederation of computer communication networks around the world. The networks that make up the Internet are connected through several backbone networks.

Descriptors relating to Quality were not used to ensure the search was not overly restricted. In order to avoid classification bias of the contents of the studies to be evaluated, articles on Coprophagia, Pica, Female Athlete Triad, Food Aversion or Binge Eating Disorder (exclusion criteria) were not included (Walsh, Garfinkel, Halmo, Mitchell & Wilson, 2000).

The final search query was performed using the Boolean union (using the AND connector), adapting it to the different databases. The searches were carried out from the first available date, in each database, to 19 March 2009 (date of last revision). Humans was used as a limit and no Tag was used.

Study variables:

Independent variables: document type, authorship, institutional affiliation of the correspondence author, geographical distribution of the origin of the articles, publication language of the article, journal in which it was published, year of publication, existence of a link to the full text and type of access (Open Access or fee-based).

Dependent variables: number of signatories per paper (collaboration index), institutional productivity on the subject (measured using Lotka's law), age of the publication, obsolescence (according to the Burton and Kleber Mean and Half-life), Price index (percentage of references equal to or less than 5 years old) and Bradford zones (in which the main nucleus represents all of the journals most relevant to an area of knowledge).

Data analysis: descriptive study of fixed indicators; calculation of the absolute and relative frequencies (percentages) of the corresponding variables, using tables and graphs to present the most revealing. In order to verify the existence of significant differences in retrieval between the periods analysed the chi-square test was used, with analysis of the significance of remainders in the cells, with Bonferroni correction for multiple tests. The significance level used in all of the hypothesis comparisons was $\alpha \leq 0.05$.

The SPSS program version 15 (SPSS, Inc., Chicago, IL, USA) for Windows was used for the input and analysis of data. Quality control of the information was carried out using double entry tables and the detected errors were corrected by consulting the originals.

Results

A total of 289 articles were found, of which 67 (23.18%) were found in MEDLINE, 22 (7.61%) in PsycINFO, 136 (47.06%) in EMBASE, 11 (3.81%) in the Cochrane Library, 50 (17.30%) in ISI Web of Knowledge and 3 (1.04%) in Psicodoc; none being found in LILACS. 99 (34.26%) repeated articles were found, leaving 190 articles which were valid for the study.

- *Scientific production and type of document:* The indexation of articles on the subject began in 1997, although no scientific production was retrieved from 1998. The year 2006 was the most productive with 33 articles, with a growing trend in the number of articles throughout the period studied. 13 different types of document were detected, one article could not be classified; the number of originals was 113 (59.47%), the productivity index is equal to 2.12. Table 1.

Table1: Scientific production and type of document on the evaluation of the quality of eating disorder websites

Typology	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009*	Total	%
Original	1	-	2	5	6	5	8	6	8	21	24	25	2	113	59.47
Review	-	-	-	-	1	-	8	7	7	5	2	2	1	33	17.37
Editorial	-	-	-	-	1	1	5	-	1	1	2	-	-	11	5.79
Communication	-	-	-	-	-	1	1	-	-	1	1	1	-	5	2.63
Note	-	-	-	-	1	1	2	1	-	-	-	-	-	5	2.63
Letter	-	-	-	-	-	-	1	-	1	2	1	-	-	5	2.63
Commentary	-	-	-	-	1	-	-	-	1	-	-	2	-	4	2.11
Book	-	-	-	-	-	1	-	1	-	-	-	1	-	3	1.58
Case report	-	-	-	-	-	2	-	1	-	-	-	-	-	3	1.58
Opinion	-	-	-	-	1	-	1	-	-	1	-	-	-	3	1.58
Short survey	-	-	-	-	-	-	-	-	-	1	-	1	-	2	1.05
Methodological	-	-	-	-	-	-	1	-	-	-	-	-	-	1	.53
Tutorial	-	-	-	-	-	-	-	-	-	1	-	-	-	1	.53
Indeterminate	-	-	1	-	-	-	-	-	-	-	-	-	-	1	.53
Total	1	0	3	5	11	11	27	16	18	33	30	32	3	190	100.00

* Between January 1st and March 19th

- *Institutional afflliation and geographical origin:* A total of 111 institutes with published works were identified, classified according to Lotka's Law into three levels of output: small producers, with a single publication (transcience index), of which 82 centres were found (73.87%); medium producers, with between 2 and 9 publications, of which 28 centers were found (25.23%); and large producers, with 10 or more publications, only one centre belonging to this category (0.90%), the University of Stanford, which produced 15 articles (7.89%). In 17 documents (8.95%) no type of affiliation was stated.

The geographical distribution of the documents according to the correspondence author, a circumstancial factor which was used to assign a country of origin to the article, showed 24 different countries, although it did reveal a predominance of the United States with 79 (41.58%) publications. Table 2.

Table 2: geographical distribution of the works published, according to the correspondence author, on the evaluation of the quality of eating disorder websites

Country	Frequency	%
U.S.A.	79	41.78
United Kingdom	26	13.68
Germany	19	10.00
Canada	11	5.79
Sweden	8	4.21
Spain	7	3.68
Australia	7	3.68
Other	33	17.37
Total	**190**	**100.00**

- *Language of publication:* The documents examined were predominantly written in English: 167 (94.84%), 13 (6.84%) in German, 4 (2.11%) in Spanish and French respectively, and also 1 (0.53%) article in Polish and 1 (0.53%) in Chinese.

- *Authorship:* With regard to the statistics related to authorship, a total of 603 signatories were counted, Minimum of 1 and Maximum of 13, the Average being 3.17 ±

0.18 (equivalent to the cooperation index). Median of 2 and Mode equal to 1. The 25 Percentile is 1 author and the 75 Percentile is 4 authors. 53 documents (29.47%) had only one author (non-colaboration articles). In the original articles a total of 398 signatories were counted, with a Minimum equal to 1 and Maximum equal to 12, Average of 3.52 ± 0.23. Mean of 3 and Mode of 2. The 25 Percentile is 2 authors and the 75 Percentil is 4 authors. 21 originals (18.58%) were non-colaborative articles.

- *Journals and dispersion of scientific literature:* A total of 112 journals were found which contained the 190 articles studied. The journals which showed 10 or more publications in the search results were: International Journal of Eating Disorders with 18 references (9.47%), European Eating Disorders Review with 17 (8.95%) and Eating Disorders with 13 (6.84%). Table 3.

Table 3: journals containing publications on the evaluation of the quality of eating disorder, constituents of the Bradford nucleus

Journal	References		
Title Abbreviation	Frequency	%	I.F.*
Int J Eat Disord	18	9.47	2.392
Eur Eat Disord Rev	17	8.95	- - -
Eat Disord	13	6.84	- - -
Pediatrics	5	2.63	4.789
J Adolesc Health	4	2.11	2.910

* I.F. = Impact Factor, data obtained from the 2008 Journal Citation Report (JCR) Science Edition Database, de la ISI Web of Knowledge, Thomson Reuters [©]

Analysing the dispersion of the scientific literature retrieved determines the concentration of a similar frequency of documents in a different number of journals: the main nucleus contains 5 journals (4.46%), which contain 57 (30.00%) articles. The second zone has 44 journals (39.29%) containing 69 articles (36.32%) and the third zone has 64 journals (57.14%) containing 64 (33.68%) articles. Figure 1.
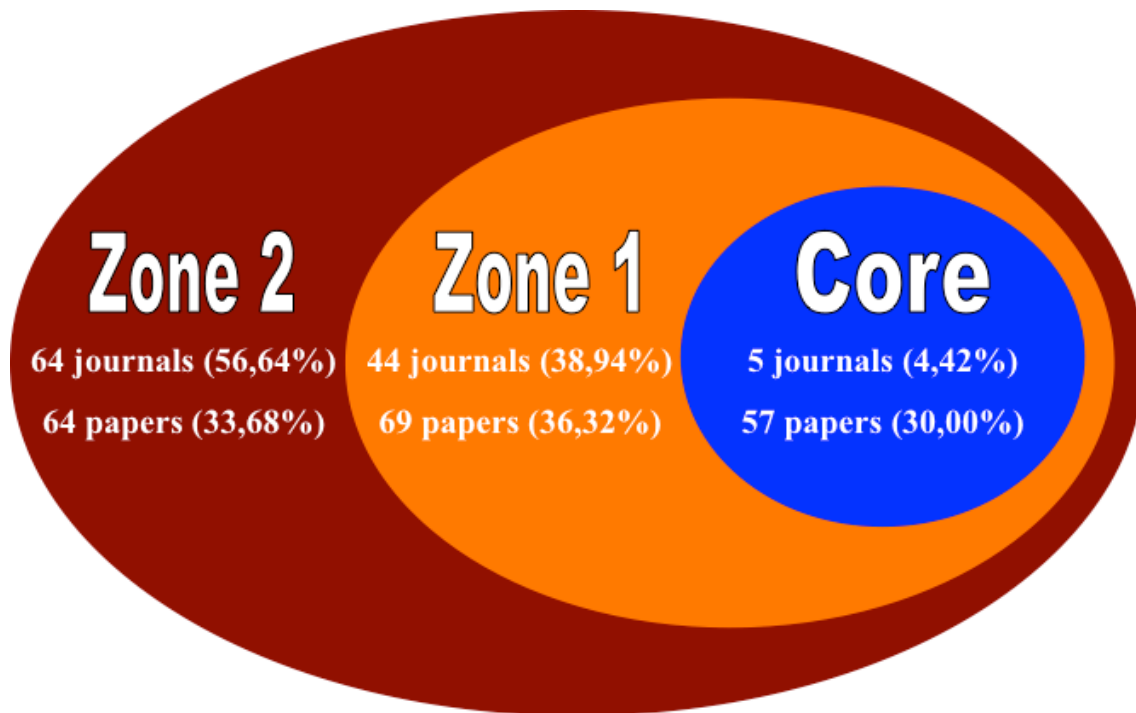
Figure 1: Dispersion of the Bradford zones of the Journals and articles retrieved, on the evaluation of the quality of eating disorder websites.

Analysing the impact factor of the 5 journals included in the main Bradford nucleus shows that 2 of the journals were not included in the *Journal Citation Report Science Edition Database, of the ISI Web of Knowledge, Thomson Reuters* [©], therefore this information could not have been known. Table 3. The average of the impact factor for this main nucleus was 3.364 ± 0.728.

- *Obsolescence/topicality of scientific production:* With regard to the age of the references retrieved the following statistics were uncovered: The average age of the articles was 3.98 ± 0.18 years (CI95% $3.63 - 4.34$), with a Minimum of 0 and Maximum of 12 years. The obsolecence of the articles examined, measured by the Median (Burton and Kebler Halflife) was 3 years and the Price index was 38.95%.

- *Access to the original document:* With regard to access to the full text from the references found (not redundant) in the databases consulted, we ascertained that the full

text could be accessed on 106 occasions (55.79%), via payment in 97 cases (51.05%) and free of charge in 9 (4.74%) cases.

By separating the references into two periods (from 1997 to 2004 and from 2004 to 2009), we can see that in the first period it is possible to access the original document in 40.54% of the cases, whereas this percentage is 65.52% in the second period. There are significant differences in the retrieval of information in the periods studied, Pearson's chi-square 11.43 (d.f. = 1; $p < 0.001$).

The existence of a link to the original document from the databases used was studied, revealing significant differences in access to the original document between the different databases, Pearson's chi-square 22.23 (d.f. = 4; $p < 0.001$); table 4. Analysis of the standardised residuals, following approximately normal distribution, allowed us to detect significant deviations (with Bonferroni correction) between the frequencies observed and those expected under the non-association hypothesis, of EMBASE *versus* MEDLINE (mean difference 0.33 ± 0.78, $p < 0.001$).

Table 4: access to the full text of the original document on the evaluation of the quality of eating disorder websites, via a link from the databases used.

Data base	Online access		
	Yes	No	Total
MEDLINE	52 (27.37%)	15 (7.89%)	67 (35.26%)
EMBASE	39 (20.53%)	48 (25.26%)	87 (45.79%)
ISI Web of Knowledge	12 (6.32%)	12 (6.32%)	24 (12.63%)
PsycINFO	2 (1.05%)	7 (3.68%)	9 (4.74%)
Psicodoc	1 (0.53%)	2 (1.05%)	3 (1.58%)
TOTAL	106 (55.79%)	84 (44.21%)	190 (100.00%)

Discussion

This study analyses the main bibliometric indicators of the evaluation of the quality of eating disorder websites in scientific literature in psychology.

With regard to production, a progressive increase is observed in the number of documents published on the topic under investigation, which although does not represent exponential growth, is due to, in accordance with scientometric theories, the fact that such growth is observed in periods of at least 30 years, a situation which has not yet occurred due to the topicality of the subject.

With regard to the type of document observed, the predominance of original articles is not a surprise given that this is an area of study which is eminently clinical and which also uses information retrieval technologies (Sanz-Valero, Juan-Quilis & Nolasco-Bonmatí, 2005). A majority in the geographical origin of the articles is revealed; the majority are affiliated to Anglophone countries (United States followed by the United Kingdom), a circumstance which coincides with that of other studies in the areas of psychology (Barrios, Borrego, Vilaginés, Ollé & Somoza, 2008; Theander & Wetterberg, 2009), nutrition (Tomás Casterá, Sanz-Valero, Juan-Quilis, Wanden-Berghe, Culebras & García de Lorenzo, 2008a) or public health (Villar Álvarez, Estrada Lorenzo, Pérez Andrés & Rebollo Rodríguez, 2007).

The publications analysed provided very adequate data with regard to obsolescence (according to the Burton-Kebler Half-life) and a good Price index (more than 1 in every 3 publications has an age inferior to 5 years), as well as a high average age, lower than the majority of bibliometric studies on health science topics (Camí, Méndez Vázquez & Suñén Piñol, 2005; Tomás Casterá, et al., 2008b; Villar Álvarez, et al., 2007) which confirms that this is an extremely topical issue.

It is striking to have found only one institution which can be considered a large producer having produced more than 10 publications on the subject under investigation. This might be explained by the fact that this subject only spans a decade of studies and

because the issues, which also deal with technological topics, present greater difficulty in carrying out field studies. Likewise, the great majority of funded research projects conclude with a single article (Valera Garrido, & De la Gala Sánchez, 2001).

Although the author designated as the correspondence author was used to study institutional affiliation and this might be detrimental to the other authors of the article, there are studies which have analysed the lack of existence of significant differences between using only this author or all of the authors (Barrios, et al., 2008).

The predominance of English is a constant in health science journals. Furthermore, the curricular requirement imposed by the academic-professional career of the authors obliges them to publish their articles in the journals contained in the ISI Web of Knowledge. A practice which is supported by their own institution which promotes and recommends submitting articles to high impact journals, largely published in English, even though this involves having to pay for the subsequent retrieval of the article or even to have it revised (Archambault, Vignola-Gagne, Cote, Lariviere & Gingras, 2006; Donato & De Oliveira, 2009). Similarly, it is well known that English is a language accepted by the majority of journals, this not being true of other languages (Agudelo, Bretón-López & Buela-Casal, 2003). For all of these reasons those authors with a greater capacity for languages, or who are able to finance the translation of their work, tend to publish in journals from English-speaking countries once they have gone through the effort of writing the article in English or having it translated. This is particularly true in the area of psychology, partly due to the journals contained in the PhycINFO database promoted by the American Psychological Association (Arnett, 2008).

The data on the number of authors indicates that there are no large research groups, the Average and Mean of the signatories per article being lower than that of other health publications. The signature index provides certain information regarding the collaboration which might exist between authors and a specific topic (Tomás Casterá, et al., 2008a). The relationship between the number of authors per article and the number of references was not studied given that previous studies have reported a weak link or even the non existence of significant differences (Barrios, et al., 2008; Lemu & Koricheva, 2005). Similar results have also been obtained in the field of Psychology (Barrios, et al., 2008; Hart, 2007). In any case, where a relationship between authorship and the number of references has been found it is due to the fact that the authors have referenced their own work (Barrios, et al., 2008; Lemu & Koricheva, 2005; Phelan, 1999). This absence of what is referred to as the "circle of references" allows us to assume low levels of communication between research teams, an occurrence also observed in bibliometric studies in Spanish and Iberoamerican psychology journals (Buela-Casal, Carretero-Dios & De los Santos-Roig, 2002; Buela-Casal, Medina, Viedma, Godoy, Lozano & Torres, 2004; Villalobos-Galvis & Puertas-Campanario, 2007).

The most referenced journals coincide with publications on psychological sciences. Likewise, the fact that these are high impact journals has previously been justified here and in other studies (Callaham, Wears & Weber, 2002), therefore it is expected that this group of journals have the highest number of references and as a result are located in the main Bradford nucleus. However, it is important to note that the 3 journals with the greatest number of works are indexed in the MEDLINE database, via PUBMED, which increases their visibility as it is a free access database (Sanz-Valero, 2007).

With regard to access to the full text of this scientific literature, it has been shown that there is little support for the Open Access initiative, which is logical if we take into account the fact that, apart from MEDLINE, the rest of the databases consulted have fee-based access. Further still, the databases which prove to be most representative, for this field, are EMBASE and PsycINFO; both of which require fee paying subscription to gain access.

It is important to point out that the retrieval of bibliographic references is enormously facilitated by use of the Internet which permits access to bibliographical data, search engines specific to the subject or to specific pages of journals. Access to the bibliography of a scientific publication is essential in order to evaluate and fully comprehend it. The more accessible the referenced materials are, the more the research is replicable. The bibliographical references can be used by the reader to efficiently access a specific area of scientific literature (Frank, 2006). The usefulness of the Internet is evident, given that without its help it would be very difficult to have this volume of information within reach and to be capable of investigating it.

In summary, this study confirms that bibliometry, the purpose of which is to plan scientific work, provides us with information about what point we are at, and points to what could be done to correct any shortcomings or deviations. This study provides a picture of the evaluation of the quality of eating disorder websites and their potential evolution. The data obtained is consistent with the idea of an emerging field of investigation which will continue to grow in coming years.

To conclude, that which is particularly worthy of note is the large institutional dispersion observed, in which there are no large producers, the articles therefore show a low collaboration index, even though the subject matter is extremely topical.

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