Nutrición Hospitalaria

Original/*Obesidad*

Analysis of information content and general quality of obesity and eating disorders websites

Juan José Hernández-Morante, Diana Jiménez-Rodríguez, Rubén Cañavate y María del Carmen Conesa-Fuentes

Department of Nursing, Faculty of Nursing, Catholic University of Murcia, Spain.

Abstract

Introduction: nowadays, the Internet is increasingly used by providers as a source of information for eating disorder health issues. However, health information on the Internet remains unregulated and varies in quality, accuracy and readability.

Objective: the objective of this study was to determine both general and information quality of eating disorder websites, including obesity websites.

Methods: three key terms (obesity, anorexia and bulimia) were entered into the Google® search engine. Websites were assessed using two tests (HonCode® certification and Bermudez-Tamayo *et al.* test) to analyze overall quality, and a third test (DISCERN test) to analyze specifically information quality.

Results: there were no significant differences regarding overall quality among the different pathologies studied ($p = 0.197$), although anorexia websites tended to obtain lower quality scores. Furthermore, all evaluated websites showed significant deficiencies regarding information quality ($p = 0.032$). Nevertheless, obesity websites showed a significant higher information quality than anorexia websites.

Discussion and conclusion: the overall quality of eating disorders websites is moderate, but the information quality that they contain is fairly poor. Remarkably, anorexia nervosa websites showed both the lower information and general quality, while bulimia websites showed a higher general quality and obesity websites presented the most reliable information.

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Key words: *Internet. Website. Obesity. Anorexia. Bulimia.*

ANÁLISIS DE LA CALIDAD GENERAL Y DE LA INFORMACIÓN CONTENIDA EN PÁGINAS WEB SOBRE OBESIDAD Y TRASTORNOS DE LA ALIMENTACIÓN

Resumen

Introducción: actualmente, el uso de Internet como fuente de información sobre temas de salud, y más concretamente sobre trastornos alimentarios, está aumentando enormemente. Sin embargo, al no existir una regulación precisa, la información disponible puede variar en calidad y fiabilidad.

Objetivo: el objetivo del presente trabajo fue determinar tanto la calidad general como la información contenida en las páginas web sobre obesidad y trastornos de la alimentación más visitadas en España.

Métodos: se introdujeron consecutivamente los términos 'obesidad', 'anorexia' y 'bulimia' en el buscador Google®. La calidad general de las páginas web se analizó mediante dos test, la certificación internacional HonCode® y el test de Bermúdez-Tamayo *et al.;* la calidad de la información se analizó específicamente con el test DISCERN.

Resultados: no observamos diferencias significativas en la calidad general entre las diferentes patologías estudiadas ($p = 0,197$), aunque las páginas web sobre anorexia obtuvieron las menores puntuaciones. Además, todas las páginas web mostraron deficiencias significativas respecto a la calidad de la información ($p = 0,032$). No obstante, las páginas sobre obesidad mostraron mayor calidad que las de anorexia.

Discusión: la calidad general de las páginas sobre trastornos nutricionales es moderada, pero la calidad de la información que contienen es bastante deficiente. Hay que destacar que las páginas web sobre anorexia mostraron tanto la peor calidad como la peor información.

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Palabras clave: *Internet. Página web. Obesidad. Anorexia. Bulimia.*

Correspondence: Juan José Hernández-Morante.
Department of Nursing, Faculty of Nursing.
Catholic University of Murcia.
Campus de Guadalupe, Avda. de Los Jerónimos, s/n.
30107-Murcia, Spain.
E-mail: jjhernandez@ucam.edu

Highlights

Internet is increasingly used by providers as a source of information for eating disorder health issues.

Health information on the Internet remains unregulated and varies in quality, accuracy and readability

To determine information quality of eating disorder websites, including obesity websites, may help in patients' assistance

Attending to our data, the overall quality of eating disorders websites is moderate, but the information quality that they contain is fairly poor.

Introduction

Currently, there is a high prevalence of both obesity and eating disorders[1.] In fact, the number of obese subjects is projected to be as high as 1.1 billion in 2030[2]. Although in a lesser extent, eating disorders are also highly prevalent (around 1%), which makes them to be considered as a serious public health problem[3].Both disorders are characterized by complex and mainly ineffective therapeutic options[4,5], so patients frequently look for information about alternative therapeutic options that use to be unrealistic and without scientific basement.

Internet has become an essential health information searching tool. Internet is the main source of scientific and health information, becoming one of the most important ways to find and post information[6-8]. Unfortunately, not all information on the Internet is adequate[9,10], as this is not always written by health professionals, with the subsequent loss of[11], and in other cases, the information provided contains highly technical language which can be overwhelming and confusing for a lay-user[6]. In addition, there are multiple advertisements on websites focused on the ideal female beauty[12], with a barrage of images and products for beauty[13]. Therefore, at this point, it comes into play economic interests that should be considered.

Previously, our group has evidenced a very low quality of general health information websites[14,15]. Since there is no previous editorial review on Internet, there is no guarantee that the information is reliable. Moreover, most information search engines do not use any kind of filter to select trustworthy information, a situation which might be regarded as especially hazardous when referring to health information[11].

Patients can visit a great number of websites with different backgrounds, ranging from personal accounts or private websites to institutional/academic websites (world health organization, Medline, PubMed)[11,16]. Nevertheless, the lay-user does not know which sources offer quality health information.

Thus, nowadays the problem is not to find information about obesity or eating disorders but to select the most relevant to their particular needs. Hence, evaluation of health information becomes essential, since poor, incomplete or even incorrect information could lead to an important impairment of the patient's health[6,17].

Objectives

For all the above mentioned, the objective of the present study was to evaluate the overall quality of the websites facing obesity and eating disorders, and to determine whether the quality of the information they contain is suitable for lay-users. A secondary objective was to compare the website quality depending on the pathology, with the aim of to detect possible differences in this regard.

Methods

Study design

To select the different websites evaluated in the present work (on day 5 December 2013) the search web Google® (http://www.google.es) was used, since it is the most commonly used Internet search engine, accounting for 69% of all Internet searches[7]. The terms "obesity", "anorexia" and "bulimia" were used every time in individual searches. Through this method, the first 50 websites, retrieved by Google®, of each condition were selected. The usefulness of this procedure to select health information websites has been previously confirmed by others authors[18,19]. Directories websites, discussion or forums websites, and websites requiring password were excluded from the present study. Finally, encyclopaedias and news websites, payment websites and websites giving an error message were also excluded. After applying these criteria, 81 websites were analysed, according to the scheme described in figure 1. The study design and protocol was reviewed and approved by the Ethics Committee of the Catholic University of Murcia.

Data collection procedures

Two test or tools were used to analyse website's overall quality, HON-Code®certification[20] and Bermúdez-Tamayo *et al*. test[21]. A third test was used to analyse specifically information quality, as was DISCERN Test[22].

HON-Code® certification score

HON-Code® certification is an ethical standard aimed at offering and assuring health information quality[23,24]. This certification demonstrates the intent of a website to publish transparent information. The trans-
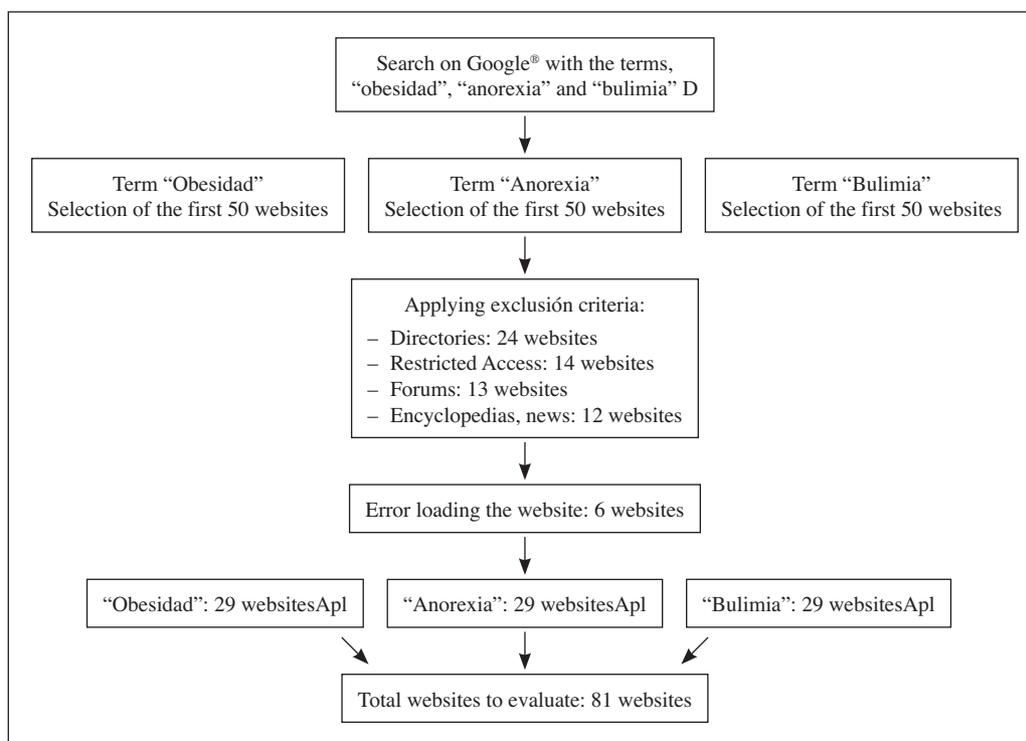
```
Search on Google® with the terms,
"obesidad", "anorexia" and "bulimia" D
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Term "Obesidad"            Term "Anorexia"            Term "Bulimia"
Selection of the first 50 websites    Selection of the first 50 websites    Selection of the first 50 websites
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Applying exclusión criteria:
 – Directories: 24 websites
 – Restricted Access: 14 websites
 – Forums: 13 websites
 – Encyclopedias, news: 12 websites
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Error loading the website: 6 websites
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"Obesidad": 29 websitesApl    "Anorexia": 29 websitesApl    "Bulimia": 29 websitesApl
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Total websites to evaluate: 81 websites
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Fig. 1.—Algorithm followed to the selection of the different websites evaluated.

parency of the website will improve the usefulness and impartiality of the information and the publication of right information[20]. HON-code® is a code of ethics that guides site managers in setting up a minimum set of mechanisms to provide quality, objective and transparent medical information tailored to the needs of the audience.

HON-Code® certifications is based on 8 principles[20] (supplemental table I), authority, which give qualifications of authors, complementarity (information to support, not replace), confidentiality, attribution, justifiability, transparency, financial disclosure (provide funding details) and advertising. For practical purposes, attribution was divided in sources and date of medical information, and in the same line, transparency was divided in webmaster and additional contact details. Based on these criteria, a website gets 1 point if it meets the criteria and 0 if it fails to comply. Therefore, each evaluated website can obtain a score ranging from 0 points (which would indicate a poor quality) to 11 points (indicating the highest quality that can be achieved). Additionally, the presence or absence of the certification mark in the different studied websites was also assessed.

Bermúdez-Tamayo et al. Test

This previously validated questionnaire[21] consists of 6 dimensions (supplemental table I): Transparency and absence of conflict of interest, authority, personal data protection, Updated Information, Accountability and Accessibility. Each of these dimensions contains a series of dichotomous response items (Yes / No), which for statistical analysis were transformed in Yes=1 and No=0.

In this sense, attending to accessibility variable, which consist of 14 items, every evaluated website may obtain a maximum score of 14 points. Thus, high scores are: transparency=5, accountability=5 Authority=2 and protection of personal data=1. Furthermore, the updated information variable comprises an item of triple response as follows: pages without update=0, with update=1, and those with update and procedure description=2. Finally, the total score of the questionnaire to measure the overall quality of each web page was calculated, reaching a maximum value of 29 points (indicating the highest quality that can be achieved)[21].

DISCERN Test

Unlike the previous two tests that measure overall quality, DISCERN test[22] only evaluates the quality of information contained in a website, which is obviously essential when we refer to health-related websites[11]. This test is composed by 16 items, on a continuous rating scale ranging from 1 to 5, where 1=definite NO and 5=definite YES. Any rating between 1-5 (such as 2, 3 or 4) indicates that some of the elements assessed by the items are presented to a certain extent. This test is divided in two major dimensions, reliability, dependability and trustworthiness of a website, and quality

of information focused on treatment options (supplemental table I). The reliability dimension, consisting of 8 items, can reach a maximum score of 40 points. In turn, the quality of information dimension, which consists of 7 items, may achieve a score of 35. Finally, the score that a website can reach would be between 0-75 points[22].

Based on this test, a website can be classified into three groups: low quality (with a score between 15-30), indicating that the website has severe or extensive shortcomings; moderate quality (with a score between 31-74), representing potentially important but not significant deficiencies; and finally a website has high quality when scores a total of 75 points[22]. A summary of all the analyzed variables in the present work is depicted in supplemental table I.

Statistical Analysis

To determine the websites quality, the accomplishment of the items of every test was calculated. The frequency and percentage of the number of websites that met every item were also calculated.

Table I

Frequency of compliance with the HONcode criteria on the different websites attending to the pathology

	Obesity (n=29)	Anorexia (n=29)	Bulimia (n=33)
Accountability	20 (69.0%)	15(51.7%)	20(60.6%)
Complementarity	13 (44.8%)	13 (44.8%)	19 (57.6%)
Confidentiality	**23 (79.3%)**	18 (62.1%)	**25 (75.8%)**
Sources	21 (72.4%)	19 (65.5%)	**25 (75.8%)**
Date of information	19 (65.5%)	17 (58.6%)	**26 (78.8%)**
Justifiability	16(55.2%)	17(58.6%)	22 (66.7%)
Webmaster	**27 (93.1%)**	**29 (100%)**	**31 (93.9%)**
Additional contact	**22 (75.9%)**	**24 (82.8%)**	**25 (75.8%)**
Sponsor	11(37.9%)	17 (58.6%)	23 (69.7%)
Advertising Policy	12(41.4%)	12 (41.4%)	16(48.5%)
Advertising	7(24.1%)	11(37.9%)	13 (39.4%)

Data represent the number of pages that meet the selected criteria. The number between brackets indicates the percentage equivalent. Those criteria met by more than 75% of the evaluated websites have been highlighted in bold character.

In addition, a one-way ANOVA analysis (website source) using a general linear model was also performed in order to determine possible significant differences taking into account the different pathologies, obesity, anorexia nervosa or bulimia. *Post-hoc* analysis was performed through Bonferroni's correction. Finally, relationships among the score obtained by the different used tests were analyzed by mean of Pearson's correlation coefficients. Student's *t*-test was also performed to analyze mean differences attending to the presence or absence of the HonCode® certification mark.

The significant level was established at a *p* value <0.05. Statistical analysis was performed through the SPSS (Statistical Package for Social Sciences, IL, USA) 21.0 for Windows.

Results

General quality of the evaluated websites attending to the pathology

Attending to the HonCode® certification, no statistically significant differences in general quality between the three pathologies were observed ($p = 0.393$), although bulimia websites (7.4 ± 2.7) showed a slight higher punctuation than anorexia nervosa (AN) (6.6 ± 2.7) and obesity websites (6.6 ± 2.8).

If we look for the presence or absence of the certification mark, our data indicated greater confidence again in bulimia websites, since 7 of the 33 (21%) websites got the HonCode® certification, while only 4 obesity and 4 anorexia websites got the certification (approximately 13%). In response to each of the items, our data indicated that the item fulfilled to a greater extent was the webmaster mail address, which was fulfilled in almost 100% of the evaluated websites. By contrast, the item fulfilled to a lesser extent was the advertising. The results obtained in each of the items are shown in table I.

When focusing on the data obtain by Bermúdez-Tamayo et al.[21] test and taking into account that the maximum score that can be reached through this test is 29 points, our data indicated that the analyzed websites got an average level, particularly in reference to the anorexia nervosa and bulimia websites. Nevertheless, our ANOVA analysis indicated no statistical significant differences according to the kind of pathology (Table II).

After analyzing each of the evaluated dimensions through Bermúdez-Tamayo et al. test, our data showed that the quality was almost similar in each pathology, excepting the dimension of data protection, which was significantly lower in AN than in obesity websites.

Information quality of the evaluated websites attending to the pathology

The most striking data when evaluating DIS-CERN test results was no evaluated website classified within the range of moderate quality, i.e., all evaluated websites presented significant deficiencies regarding the quality of the information. Specifically, from all evaluated websites ($n = 81$), 27% had potentially important but not serious deficiencies, while the remaining 72.8% had severe or extensive shortcomings. To reinforce this data, the average score of all websites studied was 30 of 75 possible points, a score below the average range. All data obtained through DISCERN test are shown in supplemental table II.

After analyze DISCERN data attending to the pathology, our results indicated total information quality was significantly higher in obesity websites ($p = 0.032$). Regarding reliability of information, the obtained score was also statistically and significantly higher in obesity and BN websites than in AN websites, whereas regarding quality of information variable, obesity websites showed higher scores than those websites focused on eating disorders (Figure 2).

Table II
Evaluation of the total Bermúdez-Tamayo et al. test score and their components, according to the pathology for which the websites are focussed

	Obesity (n=29)	Anorexia (n=29)	Bulimia (n=33)	p (ANOVA)
Total Score	18.37 ± 3.36	16.92 ± 3.48	16.93 ± 3.24	0.197
Transparency and absence of conflict	3.52 ± 1.16	3.48 ± 1.29	3.00 ± 1.63	0.308
Authority	0.85 ± 0.77	0.44 ± 0.71	0.68 ± 0.82	0.162
Personal Data Protection	0.89 ± 0.32	0.60 ± 0.50	0.75 ± 0.44	0.056
Updated Information	0.30 ± 0.47	0.24 ± 0.44	0.36 ± 0.49	0.658
Accountability	2.00 ± 1.14	2.08 ± 1.61	1.68 ± 1.44	0.541
Accessibility	10.82 ± 1.64	10.04 ± 1.72	10.46 ± 1.29	0.206

Data represent mean ± sd. Differences were estimated by mean of ANOVA analysis. Different superscript characters represent statistical significant differences.

Evaluation of the different parameters contained in the DISCERN test according to the pathology for which the websites are focussed.

	Obesity (n=29)	Anorexia (n=29)	Bulimia (n=33)	p (ANOVA)
Objectives	1.0 ± 0.00	1.08 ± 0.40	1.07 ± 0.37	0.603
Objectives achieved	0.00 ± 0.00	0.16 ± 0.62	0.14 ± 0.58	0.439
Importance	**3.30 ± 1.46**[a]	**2.44 ± 1.19**[b]	**3.21 ± 1.11**[a,b]	**0.032**
Information Source	**3.15 ± 1.99**[a]	**1.80 ± 1.53**[b]	**2.69 ± 1.91**[a,b]	**0.031**
Date	2.52 ± 1.99	1.88 ± 1.64	3.07 ± 1.96	0.074
Impartiality	2.62 ± 1.79	2.04 ± 1.54	2.79 ± 1.08	0. 165
Additional sources	2.33 ± 1.84	1.96 ± 1.65	2.59 ± 1.88	0.445
Uncertainty	2.48 ± 1.63	1.75 ± 1.15	2.52 ± 0.99	0.062
Description of Treatment	**3.15 ± 1.66**[a]	**1.88 ± 1.42**[b]	**2.07 ± 1.36**[b]	**0.005**
Benefits of Treatment	**3.22 ± 1.60**[a]	**2.04 ± 1.43**[b]	**1.62 ± 1.08**[b]	**<0.001**
Risks of Treatment	**3.07 ± 1.62**[a]	**1.80 ± 1.16**[b]	**1.55 ± 1.18**[b]	**<0.001**
Risks of not treating	1.96 ± 1.4	1.24 ± 0.66	1.48 ± 1.02	0.053
Quality of life	2.33 ± 1.47	1.96 ± 1.17	1.76 ± 1.12	0.234
Treatment Options	3.07 ± 1.71	2.28 ± 1.51	2.38 ± 1.52	0.143
Shared Treatment Decision	1.00 ± 0.00	1.00 ± 0.00	1.21 ± 0.62	0.062
Reliability	**17.30 ± 9.32**[a,b]	**13.04 ± 6.52**[b]	**18.07 ± 6.21**[a]	**0.037**
Quality Information	**17.81 ± 8.51**[a]	**12.20 ± 6.25**[b]	**12.07 ± 6.40**[b]	**0.005**
Total DISCERN	**35.11 ± 15.99**[a]	**25.24 ± 11.74**[b]	**30.14 ± 11.68**[a,b]	**0.032**

Data represent mean ± sd. Differences were estimated by mean of *one way* ANOVA analysis. Different superscript characters represent statistical significant differences.

Relation between general and information quality of the evaluated websites.

Although it is assumed that there must be a relationship between the general content and the information quality of a website, we wanted to confirm this issue.

In effect, our analysis showed a significant correlation between DISCERN and HonCode® scores ($r=0.42$, $p<0.001$). However, when the quality was analyzed based on the presence or not of the HonCode®'s certification mark, our data reflected no differences in obesity websites (Figure 3), while AN accredited websites
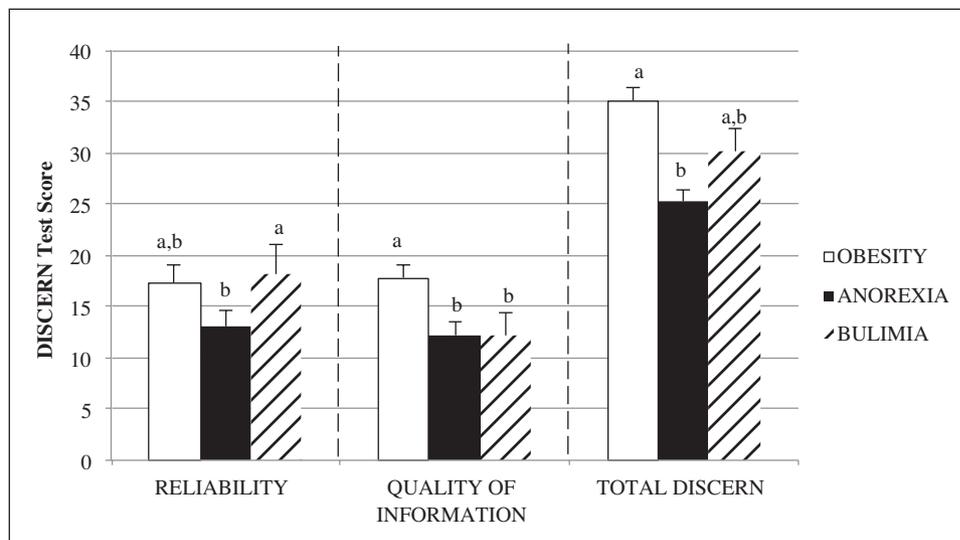

Fig. 2.—Evaluation of the total DISCERN test score and their main dimensions, reliability and quality of information, according to the pathology for which the websites are focussed. Data represent mean ± sem. Differences were estimated by mean of ANOVA analysis. Different superscript characters represent statistical significant differences.
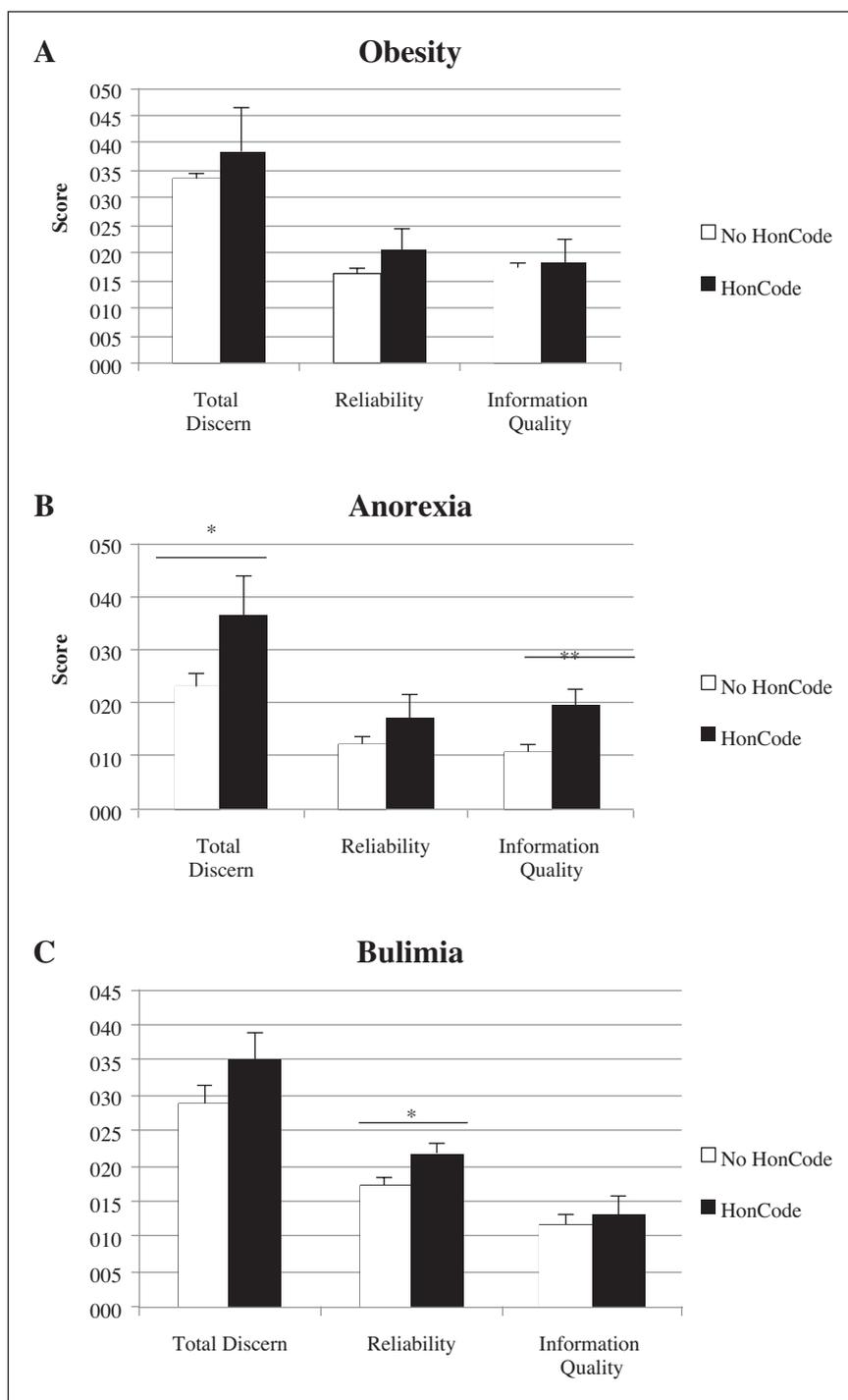
A

Obesity

B

Anorexia

C

Bulimia

*Fig. 3.—Evaluation of the total DIS-CERN test score depending on the presence or not of the Honcode® accreditation seal in (A) obesity, (B) anorexia and (C) bulimia websites. Significant differences were analysed by Student's t-test. *p < 0.050, **p < 0.010.*

showed higher quality information, and bulimia accredited websites showed higher reliability, which as a whole indicated that, at least in obesity websites, the presence of the certification mark was not an indicator of quality.

Discussion

The present study aimed to assess Spanish-language websites on obesity and eating disorders to determi-

ne their general as well as information quality. When health website quality is evaluated is not possible to use the same methodology than other websites, because the information they contain can affect, positively or negatively, in the decision-making of the subject that visits it. For this reasons, three broadly used test specifically designed to evaluate health websites were used, HonCode® certification[20] and Bermúdez-Tamayo *et al.* test[21] to assess overall quality and DISCERN test[22] to measure specifically information quality and reliability.

Attending to our HonCode® certification results, the general quality of the websites was moderate. Concretely, the highest score was seen in bulimia nerviosa (BN) websites, which indicates that developers or webmaster of these webpages pay more attention to the overall quality of their websites than in the other pathologies. This data was reflected in the presence of the HonCode® certification mark, which was higher in BN (21%) than in obesity and anorexia nerviosa (AN) websites (13%).

To our knowledge, there is no similar previous report about these disorders, however, in the revised bibliography there are extensive amounts of information about other diseases. One of the most recent focused on femoroacetabular impingement observed that only 8% of all evaluated websites contained HonCode® certification[25]. Other authors have evaluated the quality of mental health information websites[26], but contrary to our data, they observed a better quality content. However, and as our data indicated, they observed a great quality variability attending to the evaluated disease.

An important fact that can be drawn from our study was the item fulfilled to a greater extent was the webmaster address. In our opinion, this item has no special relevance in health websites, whereas other relevant items for health, such as confidentiality, authority or sources were met in a lesser degree. In fact, advertising was the item fulfilled to a lesser extent. Precisely, a debate on internet about the use and marketing of health-related advertising is emerging, and great concerns have arisen about loss of credibility and information quality that might be associated to advertising in this kind of websites[27].

Our results obtained by Bermudez-Tamayo et al. test[21] confirmed that the general quality of obesity and eating disorders (ED) websites was moderate, with a very similar score among the 3 different pathologies. These data are concordant with the results obtained in previous studies also conducted on general health information websites[14,15]. Again, several parameters such as personal data protection were met in a small extent, especially in AN websites. In our opinion, this data is quite surprising, since it is logical to assume that to pay attention on personal data protection should be necessary to keep user's confidentiality. It is important to emphasize that the webmaster, as responsible for the contents, should take such criteria into account; firstly, because it is required by the Spanish Government laws[28], and secondly, because a lack of privacy goes against the patient's right to data privacy. In fact, as previously described by several authors[9,29,30], confidentiality and data privacy are the most valued issues for the customer of health websites.

The results obtained regarding information quality were even more discouraging, since our data indicated that no evaluated website could be classified even within the range of moderate quality. Similar data were obtained by Wasserman et al.[31] regarding colorectal disease websites, where was described that the information was transmitted improperly besides being highly variable and incomplete. In the same context, the work of Dillon et al.[7] focused on dementia websites also revealed a low quality; however, this study only evaluated 7 websites, so data should be extrapolated with carefulness. Also, the work of Coquard et al.[32] performed on alcohol-dependence websites informed a relative low quality. Perhaps, the most important data of Coquard et al.[32] was after one-year follow-up, the websites analyzed did not improve their quality. Nevertheless, it is noticeable to comment that in the revised literature there is some disparity attending to the evaluated disorder. In this regard, the evaluation of chronic pain websites performed by Kaicker et al.[6] showed a moderate quality, whereas the work of Klila et al.[23] focused on obsessive compulsive disorder websites revealed a good information quality.

In the present work, our results indicated that obesity webpages showed higher scores of importance, information source, description, benefits and risks of treatment as well as reliability and total DISCERN test. As a consequence, lay-users obtained more reliable information regarding obesity than eating disorders. From our point of view, this fact may be probably due to the different prevalence of every disorder. Obesity prevalence in developed countries is around 50% of the population[2], while eating disorders prevalence is estimated to be of 1%[3]. Whatever the case, our data indicated that more effort should be done to increase information quality of ED websites, especially those focused on AN.

A relation between overall quality and information quality was observed in the present study. To some extent, it is logical to assume that the more general quality of a website, the more information quality will present. However, this relation was only observed between HonCode® and DISCERNS score. Again, there is some controversial in this regard in the bibliography, since a previous report of O'Neill et al.[8] also observed that HonCode® certified websites achieved significantly greater DISCERN punctuations. On the contrary, Lee et al.[26] observed that HonCode® certified websites showed as much information quality variability as noncertified websites.

At this point, we would like to comment some strengths and limitations of the present work. In this study the first 50 pages obtained by introducing the terms of obesity, bulimia and anorexia nervosa were analyzed, which has an advantage over other studies that took into account only the first 20 or 30 websites[6,33,34]. This allows us to analyze a wider number of websites and establishes firmer conclusions than in previous studies where the sample size was smaller. However, a limitation was to use Google® as the only web search engine. Probably, the use of specialized health search engines, like PubMed® or Web of Knowledge® might retrieve specific reliable information, but with the disadvantage that no every single lay-user would correctly interpret the obtained information.

In summary, the overall quality of obesity and ED websites was moderate, whereas the information quality was fairly poor. Remarkably, AN websites showed the lower information and general quality; alike, BN websites showed higher overall quality and obesity websites presented the higher information reliability. Therefore, although there was some reliability of the health websites and minimum criteria were met, there was no presence of the HonCode® certification mark in most of them, which can be deduced that there is no clear awareness to follow minimum quality parameters.

Eating disorders patients, especially those suffering from AN, should take internet information available with great concern, and in the last term, a specialized professional should be consulted to solve questions and doubts about their pathology. Nevertheless, webmaster or the person in charge of the websites should make an effort to increase both overall quality, but specially, the information reliability placed on their websites. In our opinion, the information available on the Internet about these public health issues such as obesity and ED should be increased in order to avoid possible health complications. Due to the low quality observed both in our study and in the reviewed bibliography, Governments and other statements should exert more control over the health contents on Internet.

Acknoledgements

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