





# How trustworthy is online dental information for individuals with Down syndrome from Ibero-American countries?

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## Abstract

**Background:** Internet has become an indispensable source of health-related information. However, several studies have shown there to be a lack of quality control for webpages related to disability. Specifically, available content concerning Down syndrome (DS) and dentistry is limited and of dubious quality.

**Objective:** The aim of the present study was to assess the quality of online content in Spanish and Portuguese on dental care for individuals with DS.

**Methods:** A simultaneous search in Google and Bing using the terms “Down syndrome” and “odontology/dentist/dental treatment” in Spanish and Portuguese was conducted in seven Ibero-American countries (Argentina, Brazil, Chile, Colombia, Spain, Mexico, and Portugal). The first 100 consecutive pages of results from the three combinations of terms in each of the search engines were accessed and selected by applying conventional exclusion criteria. The selected pages were classified according to their authorship, specificity and dissemination potential. The quality of the online content was assessed using the DISCERN questionnaire and the Questionnaire to Evaluate Health Web Sites According to European Criteria (QEEC). The presence of the Health On Net (HON) and Accredited Medical Website (AMW) seals was also assessed.

**Results:** The mean DISCERN score was  $2.51 \pm 0.85$  and  $2.57 \pm 0.86$  for the Spanish and Portuguese webpages, respectively. The mean readability score was  $3.43 \pm 1.26$  and  $3.25 \pm 1.08$  for the Spanish and Portuguese webpages, respectively. None of the selected webpages presented the HONcode or AMW trust seals.

**Conclusions:** The content available online in Spanish and Portuguese regarding Down syndrome and dentistry is scarce and of highly questionable quality.

## KEYWORDS

dental treatment, dentist, disabilities, Down syndrome, odontology

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## 1 | INTRODUCTION

Down syndrome (DS) is caused by the partial or total presence of an extra chromosome in pair 21 and is the most common human aneuploidy, with an estimated prevalence of one case for every 800 live births.<sup>1</sup> DS is associated with intellectual disability and presents a characteristic phenotype in which a number of orofacial abnormalities are common.<sup>2</sup> Oral health problems are highly frequent in DS and often directly affect these patients' quality of life.<sup>3</sup> These oral abnormalities include structural abnormalities (taurodontism, reduced crown-to-root ratio, microdontia, abnormal crown shape, macroglossia, fissured tongue), abnormal number of teeth (hypodontia) and abnormal tooth eruption patterns (delayed or atypical);<sup>4,5</sup> as a result, malocclusions of the teeth are also common.<sup>6</sup> Individuals with DS are also at greater risk of developing periodontal disease, probably due to deficient dental hygiene, limited manual dexterity, a compromised immune system and a certain genetic susceptibility.<sup>7,8</sup>

Various barriers have been reported that impede access to dental care by individuals with DS, including their guardians' lack of awareness regarding their oral health needs.<sup>9</sup> Parents of children with intellectual disability (including those with DS) have expressed the need for accessing appropriate information regarding their children's oral health starting from the first years of life.<sup>10</sup> The Internet has become an indispensable source of health-related information, playing to a wide range of audiences who seek guidance for various medical conditions.<sup>11,12</sup> For the past decade, however, studies have shown there to be a lack of quality control for webpages related to information on disability.<sup>13</sup> Buteau-Poulinet et al.<sup>14</sup> recently examined the available online information for parents of children with disabilities and found that more than 50% of the analyzed webpages contained information that had not been reviewed by practitioners/experts before the webpages' publication or that were not frequently updated.

In a preliminary study published in 2016,<sup>15</sup> we analyzed the quality of publicly accessible webpages in Spain with information on DS and dentistry, aimed at users who are not healthcare practitioners. The conclusion of this study was that the resources related to DS and dentistry were highly scarce and of questionable quality.

Webpages currently offer an overwhelming quantity of information, making it imperative to evaluate the relevance, accuracy and rigor of the resources available online for individuals, families and healthcare practitioners who seek guidance on specific aspects of medical care. The aim of the present study was to assess the quality of Spanish and Portuguese webpages on dental care for individuals with DS, accessible from Ibero-America.

## 2 | METHODS

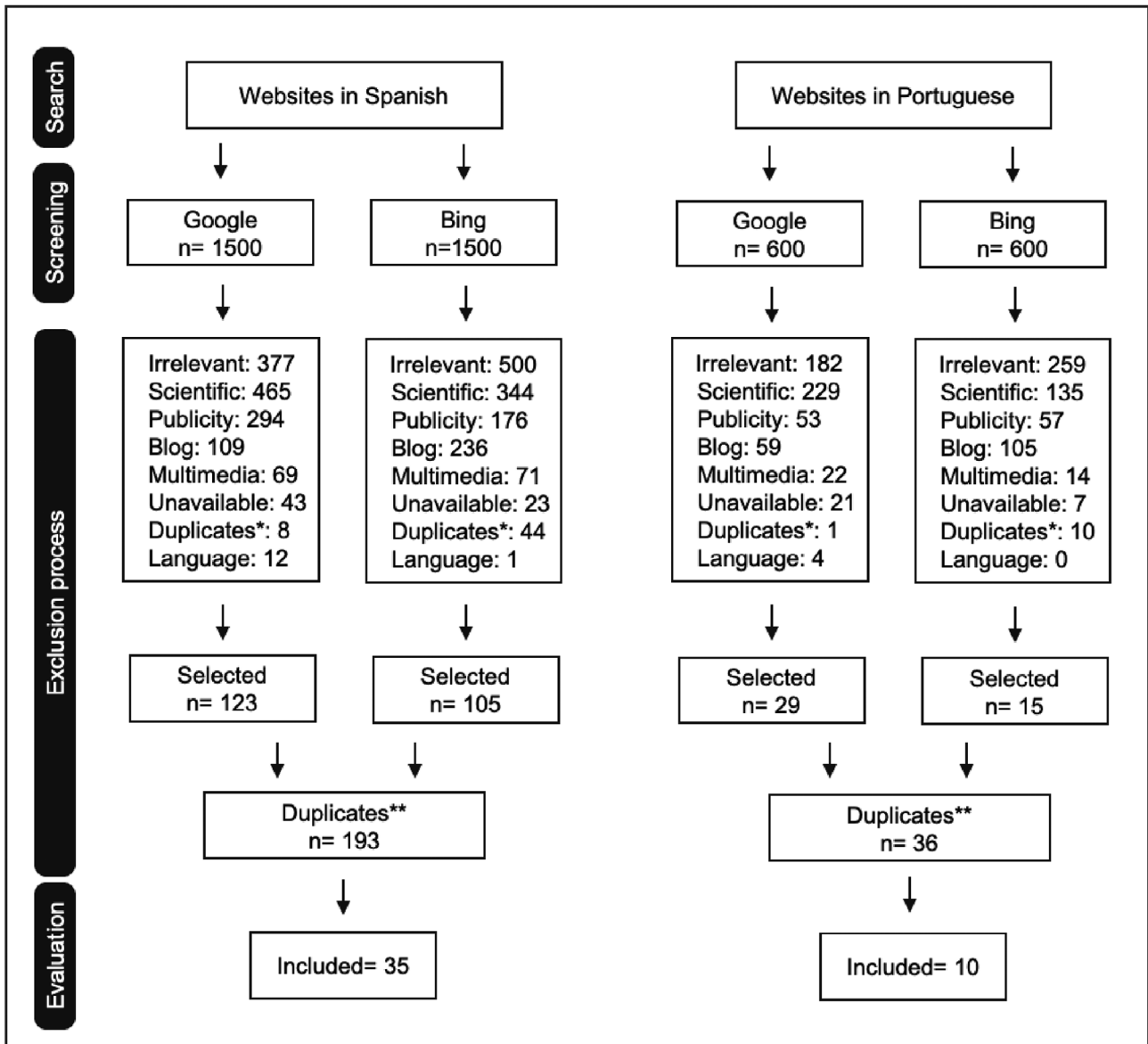
### 2.1 | Search strategy and website identification

A search was performed with the Google and Bing search engines of webpages on dentistry and DS in seven Ibero-American countries. The search was simultaneously conducted in July 2021 in seven countries: Argentina, Brazil, Chile, Colombia, Spain, Mexico and Portugal. The languages employed based on the participating countries were Spanish (for the search in Argentina, Chile, Colombia, Spain and Mexico) and Portuguese (for the search in Brazil and Portugal). The combinations of keywords employed in Spanish were “*Odontología y Síndrome de Down*” (Odontology and DS), “*Tratamiento Dental y Síndrome de Down*” (Dental Treatment and DS) and “*Dentista y Síndrome de Down*” (Dentist and DS). In Portuguese, the combinations were “*Medicina Dentária e Síndrome de Down*” (Dental Medicine and DS), “*Tratamento Dentário e Síndrome de Down*” (Dental Treatment and DS) and “*Médico Dentista e Síndrome de Down*” (Dentist and DS).

The searches were performed by seven separate examiners (one for each participating country) who were provided instructions on the selected search engines, the keyword combinations (in Spanish or Portuguese) and the date on which to conduct the search. The search was conducted in incognito mode, and steps were taken to ensure that the users were disconnected from all accounts. The initial selection included the first 100 webpages for each of the search engines for each combination of key words, which represented a total of 600 webpages per country. The definitive selection of webpages included in this study was performed independently by two examiners with experience in dental care for patients with DS, applying the following exclusion criteria: pages with irrelevant information (i.e., contents that do not cover the topic or did not meet the search criterion), multimedia files (e.g., videos and images), scientific material (e.g., articles and books), blogs and forums, language (i.e., other than Spanish and Portuguese), nonfree or unavailable webpages, and promotional dental clinic webpages. In the event of disagreement, a third reviewer was involved (Figure 1). Applying these criteria, we ultimately included 35 webpages in Spanish and 10 in Portuguese.

### 2.2 | Categorization of websites

In the selected webpages, we identified the entity responsible/sponsor (editorial groups, nonprofit



\* Duplicates among the first 100 webpages obtained after applying a single combination of keywords in a specific Spanish or Portuguese speaking country. \*\* Duplicates among the first 100 web pages obtained after applying the 3 combinations of keywords in the 5 Spanish or the 2 Portuguese speaking countries.

FIGURE 1 Duplicates among the first 100 web obtained after applying the 3 combinations of keywords in the 5 Spanish or the 2 Portuguese speaking countries.

organizations, medical institutions, companies or government establishments), the specificity (fully or partially related to the topic),<sup>16</sup> and the dissemination potential (among those that performed the search, the number of countries in which a specific website appeared). We also assessed the contents covered in the webpages (oral anatomy, oral functionality, and dental treatment).

### 2.3 | Quality assessment

The quality assessment of the selected webpages was conducted using the DISCERN questionnaire and the Questionnaire to Evaluate Health Web Sites According to European Criteria (QEEC). Additionally, the presence of the Health on Net (HONcode) and Accredited Medical Web (AMW) trust seals was recorded.

DISCERN is a validated questionnaire designed specifically to judge the quality of written information on treatment options. The questionnaire consists of 16 items, with eight questions that examine reliability (questions 1–8), six on treatment options (questions 9–15), and a general score for quality (question 16). Every question is scored on a numerical scale of 1–5 (1 = highly deficient, 2 = deficient, 3 = moderate, 4 = good, 5 = excellent). DISCERN has demonstrated interobserver reliability and construct validity when used by healthcare information providers and laypersons.<sup>17</sup>

The QEEC<sup>18</sup> is a tool specifically designed to assess the quality of healthcare websites in the Ibero-American setting and was developed from the e-Europe 2002 code of conduct<sup>19</sup> and taking into account other codes, current regulations and guidelines to facilitate its cultural adaptation. The QEEC consists of 17 questions distributed into five sections, which evaluate the website's transparency and absence of conflicts of interest, as well as authorship, personal data protection, responsibility and accessibility.

The HONcode trust seal<sup>20</sup> is the most widely used to assess the trustworthiness and usefulness of medical information available online, as well as compliance with the principles that govern them including authorship, complementarity, confidentiality, attribution, guarantee, authorship transparency, sponsorship transparency, and honesty in the publishing and editorial policies (<http://www.hon.ch/HONcode/>).

We also assessed the presence of the seal with the greatest acceptance in Ibero-American countries, the AMW,<sup>21</sup> a program of the Official College of Physicians of Barcelona (Spain) that identifies those webpages of the healthcare sector that meet certain quality and reliability requirements. The AMW is regulated by good practice principles related to identifying the responsible entities, contents, confidentiality, safety, publication and funding, virtual consultation service and the option of withdrawing the seal in the case of noncompliance (<https://wma.comb.es/es/home.php>).

### 3 | RESULTS

Of the initially selected 3000 webpages in Spanish (100 webpages × 3 combinations of keywords × 2 search engines × 5 countries), 35 were ultimately selected after applying the exclusion criteria (Figure 1; Table 1). Of the initially selected 1200 webpages in Portuguese (100 webpages × 3 combinations of keywords × 2 search engines × 2 countries), 10 were ultimately selected after applying the exclusion criteria (Table 2). The most common reasons for excluding the Spanish webpages were the irrelevant nature of the website (40.9%), webpages related to articles and

books (37.7%), and promotional webpages for dental clinics (21.9%) (Figure 1). The most common reasons for excluding the Portuguese webpages were the irrelevant nature of the website (36.7%), webpages related to articles and books (30%), and those corresponding to blogs and discussion forums (13.6%).

Of the 35 selected Spanish webpages, the responsible entity/sponsor in most cases was editorial groups (40%) and nonprofit organizations (28.5%). Only six of these webpages were completely related to the topic that was the object of the study (17.1%), while the remaining 29 (82.8%) were partially related. Of the selected Spanish webpages, only 1 of the 35 (belonging to the National Down Syndrome Society) was found among the five Spanish-speaking countries in which the search was performed (Argentina, Chile, Colombia, Spain and Mexico), while another nine were detected in four of these five countries (paradoxically, only one of these nine was detected in the search conducted from Spain).

In the search performed in Portuguese, editorial groups were the responsible entity for 50% of the selected webpages, while medical institutions were responsible for 30%. In six of these webpages, the content was considered completely related to the topic that was the object of study (60%). Of the 10 selected Portuguese webpages, six were detected in the searches performed both in Brazil and Portugal.

Of the Spanish webpages, 85% provided content on oral anatomy, 77% provided content on dental treatment, and 31.4% provided content on oral functionality. Of the Portuguese webpages, 100% provided content on oral anatomy, 90% provided content on dental treatment, and 30% provided content on oral functionality.

#### 3.1 | DISCERN

The mean score for the selected Spanish webpages when applying the DISCERN tool was  $2.51 \pm 0.85$ . The score reached  $2.62 \pm 0.62$  in the information reliability section,  $2.38 \pm 0.33$  in the treatment options section, and  $2.42 \pm 0.65$  in the final question of the overall assessment. The highest-rated question referred to the impartiality of the information ( $3.6 \pm 1.11$ ), while the lowest-rated question referred to the information provided on the consequences of not performing the treatment ( $1.88 \pm 0.58$ ). The highest-rated website ( $3.68 \pm 1.25$ ) was that of the National Down Syndrome Society, which was completely related to the topic of the study and was prepared by a nonprofit organization (Table 1, code S1).

When applying the DISCERN tool, the mean score for the selected Portuguese webpages was  $2.57 \pm 0.86$ ; the information reliability section scored  $2.57 \pm 1.00$ , the

**TABLE 1** Selected Spanish webpages: Values obtained with the DISCERN tool and compliance with the principles governing the HONcode trust seal.

CODE	URL	DISCERN	HONcode								
			I	II	III	IV	V	VI	VII	VIII	
S1	<a href="http://www.ndss.org...">http://www.ndss.org...</a>	3.68 ± 1.25									
S2	<a href="http://www.sindromedown.net...">http://www.sindromedown.net...</a>	3.43 ± 1.31	X						X	X	
S3	<a href="http://www.odontologiaactual.com/...">http://www.odontologiaactual.com/...</a>	3.31 ± 0.79	X					X	X	X	
S4	<a href="http://fiadown.org/...">http://fiadown.org/...</a>	3.31 ± 0.94	X					X	X	X	
S5	<a href="http://odontologiaa.mx...">http://odontologiaa.mx...</a>	3.12 ± 1.20						X	X		
S6	<a href="https://sites.google.com...tratamiento-odontologico">https://sites.google.com...tratamiento-odontologico</a>	3.06 ± 1.81						X			
S7	<a href="http://www.prensalibre.com...">http://www.prensalibre.com...</a>	3.00 ± 0.47		X					X	X	
S8	<a href="http://www.movimientodown.org...">http://www.movimientodown.org...</a>	2.87 ± 1.54	X	X					X	X	
S9	<a href="https://www.odontologos.mx...">https://www.odontologos.mx...</a>	2.87 ± 0.70			X						X
S10	<a href="http://periodonciacostarica...sindrome-de-down...">http://periodonciacostarica...sindrome-de-down...</a>	2.75 ± 0.85	X					X	X	X	
S11	<a href="http://www.aamade.com...">http://www.aamade.com...</a>	2.75 ± 0.93	X					X	X	X	
S12	<a href="https://www.espaciologopedico.com...">https://www.espaciologopedico.com...</a>	2.68 ± 0.47	X		X			X	X	X	
S13	<a href="http://www.pasoapaso.com...">http://www.pasoapaso.com...</a>	2.62 ± 1.08	X					X	X	X	
S14	<a href="http://espidident.es/...">http://espidident.es/...</a>	2.62 ± 0.95	X						X	X	
S15	<a href="http://www.odontologiaparabebes.com...">http://www.odontologiaparabebes.com...</a>	2.50 ± 1.03							X	X	
S16	<a href="https://www.revista-portalesmedicos.com...">https://www.revista-portalesmedicos.com...</a>	2.43 ± 0.89	X					X	X	X	
S17	<a href="https://www.odontoespacio.../tecnicas-de-cepillado...">https://www.odontoespacio.../tecnicas-de-cepillado...</a>	2.43 ± 0.89			X						X
S28	<a href="http://webdental.c...">http://webdental.c...</a>	2.37 ± 0.95						X	X		
S19	<a href="http://www.asalsido.org...">http://www.asalsido.org...</a>	2.37 ± 0.71						X	X	X	
S20	<a href="https://sites.google.com/...sindrome-de-down...">https://sites.google.com/...sindrome-de-down...</a>	2.37 ± 0.61	X					X	X		
S21	<a href="http://www2.gobiernodecanarias.org/...">http://www2.gobiernodecanarias.org/...</a>	2.31 ± 1.07									
S22	<a href="http://www.elportavoz.com...">http://www.elportavoz.com...</a>	2.25 ± 1.00									
S23	<a href="http://www.down21.org/...">http://www.down21.org/...</a>	2.25 ± 1.06									
S24	<a href="https://www.rchsd.org...">https://www.rchsd.org...</a>	2.25 ± 0.68							X	X	
S25	<a href="https://www.odontoespacio...pacientes-con-sindrome...">https://www.odontoespacio...pacientes-con-sindrome...</a>	2.25 ± 0.57			X				X		
S26	<a href="https://talitaodonto.wordpress.com...">https://talitaodonto.wordpress.com...</a>	2.18 ± 0.65									
S27	<a href="http://periodonciacostarica...dental-especial">http://periodonciacostarica...dental-especial</a>	2.18 ± 0.65							X	X	
S28	<a href="http://www.drashirleydecampos.com...">http://www.drashirleydecampos.com...</a>	2.12 ± 0.50	X					X	X		
S29	<a href="http://bitacoramedica.com/...">http://bitacoramedica.com/...</a>	2.12 ± 0.80							X	X	
S30	<a href="https://sites.google...sindromededownenodontologia/">https://sites.google...sindromededownenodontologia/</a>	2.12 ± 1.41									X
S31	<a href="https://photonews.do/...">https://photonews.do/...</a>	2.06 ± 0.44							X	X	
S31	<a href="http://www.inpn.com...">http://www.inpn.com...</a>	1.93 ± 0.77						X	X		
S33	<a href="http://www.wwow.com...">http://www.wwow.com...</a>	1.93 ± 0.77							X		
S34	<a href="http://sorrisonovo.org...">http://sorrisonovo.org...</a>	1.81 ± 0.65							X	X	
S35	<a href="http://www.dsagc.com...">http://www.dsagc.com...</a>	1.43 ± 0.51									

Note: I. Authorship, II. Complementarity, III. Confidentiality, IV. Attribution, V. Guarantee, VI. Authorship transparency, VII. Sponsorship transparency, VIII. Honesty in the publishing and editorial policy.

treatment options section scored  $2.57 \pm 0.71$ , and the last question of the overall assessment scored the highest with  $2.60 \pm 0.69$ . The highest-rated question referred to the clarity of the objectives ( $3.60 \pm 0.69$ ), while the lowest-rated question described the sources of information

( $1.50 \pm 1.09$ ). The highest rated website ( $3.31 \pm 0.79$ ) was that of “*Odontologia Actual*” (Current Odontology), paradoxically written in Spanish and partially related to the topic of the study and developed by a Mexican editorial group (Table 2, code P5).

**TABLE 2** Selected Portuguese webpages: Compliance with the principles governing the HONcode trust seal and values obtained with the DISCERN tool.

CODE	URL	DISCERN	HONcode							
			I	II	III	IV	V	VI	VII	VIII
P1	<a href="http://www.wwow.com...">http://www.wwow.com...</a>	1.93 ± 0.77							X	
P2	<a href="http://www.inpn.com...">http://www.inpn.com...</a>	1.93 ± 0.77						X	X	
P3	<a href="https://talitaodonto.wordpress.com...">https://talitaodonto.wordpress.com...</a>	2.18 ± 0.65								
P4	<a href="http://projetodesin.wixsite.com/.../Características-bucais-e-tratamento-odontológico-no-pacie...">projetodesin.wixsite.com/.../Características-bucais-e-tratamento-odontológico-no-pacie...</a>	2.12 ± 0.61	X					X	X	
P5	<a href="http://www.odontologiaactual.com/...">http://www.odontologiaactual.com/...</a>	3.31 ± 0.79	X					X	X	X
P6	<a href="http://www.movimentodown.org">http://www.movimentodown.org</a>	2.87 ± 0.71	X	X					X	X
P7	<a href="http://www.consejodontistas.es/.../467-guia-de-atencion-bucodental.htm...">www.consejodontistas.es/.../467-guia-de-atencion-bucodental.htm...</a>	3.43 ± 0.41	X					X	X	
P8	<a href="http://webdental.c...">http://webdental.c...</a>	2.37 ± 0.95						X	X	
P9	<a href="https://www.odontoespacio.../tecnicas-de-cepillado...">https://www.odontoespacio.../tecnicas-de-cepillado...</a>	2.43 ± 0.89			X				X	
P10	<a href="http://odontologia.mx.tripod/síndrome_down/html">odontologia.mx.tripod/síndrome_down/html</a>	3.12 ± 1.20								

Note: I. Authorship, II. Complementarity, III. Confidentiality, IV. Attribution, V. Guarantee, VI. Authorship transparency, VII. Sponsorship transparency, VIII. Honesty in the publishing and editorial policy.

### 3.2 | QEEC

When applying the QEEC to the selected Spanish webpages, 30% of them did not identify the individual or organization responsible for the website. None of the 31 evaluated webpages (four ceased to be available during the assessment process) categorically met the requirements for data protection (criterion 8) nor did they describe the information updating procedure (criterion 9). None of them had an effective online consultation service even when the service was offered (criterion 11), none of them stated the procedure for selecting content and links (criteria 12 and 13), and none were accessible for individuals with disability or learning difficulties (criterion 17). These results are listed in Table 3. The mean readability score was  $3.43 \pm 1.26$ .

When applying the QEEC to the selected Portuguese webpages, 20% did not identify the individual or organization responsible for the website. As with the Spanish webpages, none of the 10 evaluated Portuguese webpages categorically met criteria 8, 9, 11, 12, 13, or 17. These results are listed in Table 4. The mean readability score was  $3.25 \pm 1.08$ .

### 3.3 | HONcode and AMW

None of the selected webpages in Spanish or Portuguese showed the presence of the HONcode trust seal or the

AMW seal. Tables 1 and 2 list the HONcode criteria met by the selected webpages; none of the webpages met all eight criteria established by HON; additionally, a number of the webpages met none of the eight criteria.

## 4 | DISCUSSION

To the best of our knowledge, this is the first study to evaluate the quality of Spanish and Portuguese information on dental care for individuals with DS. After applying the aforementioned exclusion criteria, only 35 webpages in Spanish and 10 in Portuguese were selected, and their quality was generally deficient.

The search was conducted in Spanish and Portuguese because these are the representative languages of Ibero-America. The study therefore assessed information that could be viewed by 727 million individuals. It is estimated that worldwide 512 million individuals speak Spanish (the second most widely spoken language), which is the official language not only of Spain but also of 19 Latin American countries and one African country. The impact of Spanish has been boosted by migrations; in the United States, for example, there are already more Spanish speakers than in Spain (<https://lingua.edu/the-most-spoken-languages-in-the-world/>). Portuguese is in ninth place among languages spoken worldwide, particularly due to its colonial past, which facilitated its expansion to today's 215 million individuals in countries

TABLE 3 Selected Spanish webpages: Assessment applying the “Questionnaire to Evaluate Health Web Sites According to European Criteria.

CODE	Transparency conflicts of interest							Data protection			Updating			Accountability			Accessibility		
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17		
S1	Yes	Yes	Yes	Yes	Yes	No	No	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S2	Yes	Yes	No	No	No	Yes	Yes	NA	NA	Yes	P	No	No	Yes	No	3	No		
S3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S4	Yes	Yes	No	No	No	No	No	NA	NA	No	No	No	No	Yes	No	2.5	No		
S5	Yes	No	No	No	Yes	Yes	No	NA	NA	No	No	No	No	P	No	5	No		
S6	Yes	No	No	Yes	No	P	Yes	NA	NA	No	NA	No	No	Yes	Yes	5	No		
S7	Yes	Yes	Yes	Yes	Yes	NI	No	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S8	No	No	Yes	Yes	No	No	Yes	NA	NA	No	N	No	No	Yes	Yes	5	No		
S9	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	NA	Yes	NA	No	No	Yes	P	5	No		
S10	Yes	Yes	Yes	Yes	No	No	Yes	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S11	Yes	Yes	Yes	Yes	No	No	Yes	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S12	No	No	No	No	No	No	Yes	NA	NA	Yes	NA	No	No	Yes	Yes	3	No		
S13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	Yes	NA	No	No	Yes	P	4	No		
S14	Yes	Yes	Yes	Yes	Yes	No	No	NA	NA	Yes	NA	NA	No	Yes	Yes	4	No		
S15	Yes	Yes	Yes	Yes	Yes	No	No	NA	NA	Yes	NA	No	No	Yes	Yes	5	No		
S16	No	No	No	No	No	Yes	Yes	NA	NA	No	NA	No	No	No	No	2	No		
S17	Yes	Yes	No	No	No	No	No	NA	NA	Yes	No	No	No	Yes	Yes	4	No		
S28	No	No	No	No	No	Yes	Yes	NA	NA	No	No	No	No	Yes	P	3	No		
S19	Yes	Yes	Yes	Yes	Yes	No	Yes	NA	NA	Yes	No	No	No	Yes	Yes	3	No		
S20	Yes	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No	2	No		

(Continues)

TABLE 3 (Continued)

CODE	Transparency conflicts of interest				Authorship			Data protection		Updating			Accountability			Accessibility		
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	
S21																		
S22																		
S23																		
S24	Yes	No	No	Yes	No	No	No	NA	No	Yes	No	No	No	Yes	No	3	No	
S25	No	No	Yes	No	No	Yes	Yes	NA	No	Yes	No	No	No	P	P	2	No	
S26	No	No	No	No	No	No	Yes	NA	No	No	P	No	No	No	P	3	No	
S27	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	NA	Yes	NA	No	No	Yes	P	5	No	
S28	Yes	Yes	Yes	No	No	No	Yes	NA	No	Yes	No	No	No	No	No	2	No	
S29	No	No	No	No	Yes	Yes	Yes	NA	No	No	No	No	No	P	P	2	No	
S30	No	No	No	No	No	No	No	NA	No	No	No	No	No	P	P	2	No	
S31	Yes	No	No	No	No	No	Yes	NA	No	No	No	No	No	No	No	2	No	
S31	Yes	Yes	No	No	No	No	Yes	NA	No	Yes	No	No	No	No	No	2	No	
S33	Yes	Yes	Yes	No	No	No	No	NA	No	Yes	No	No	No	No	No	2	No	
S34	Yes	Yes	Yes	Yes	Yes	No	Yes	NA	No	Yes	No	No	No	Yes	Yes	4	No	
S35	No	No	No	No	No	No	No	NA	No	No	No	No	No	No	No	2	No	

Note: Cx, criterion; 1. Name of the individual or organization responsible for the website; 2. Email or physical address responsible for the website; 3. Specification of the website's purpose or objective; 4. Specification of the target population(s); 5. Specification of the funding sources for the development or maintenance of the website; 6. Declaration of the sources of information; 7. Date of publication; 8. Description of the protection method for information regarding a natural person (identified or identifiable) and data processing; 9. Description of the information update procedure; 10. Is there a contact email address to which comments and suggestions can be sent (webmaster) or another option for contacting the entity responsible for the webpage?; 11. In the event an online health-related consultation service is offered, do they deliver what they offer?; 12. Editorial policy. Declaration of the procedure for selecting content; 13. Editorial policy. Declaration of the procedure for selecting links; 14. Ease in finding content; 15. Ease in performing searches; 16. Readability; 17. Accessibility for individuals with disability or learning difficulties; P, partial or doubtful; NA, not applicable. The four webpages that were not assessed ceased to be available during the assessment process.

TABLE 4 Selected Portuguese webpages: Assessment applying the “Questionnaire to Evaluate Health Web Sites According to European Criteria

CODE	Transparency conflicts of interest					Authorship		Data protection		Updating			Accountability			Accessibility		
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	
P1	Yes	Yes	Yes	No	No	No	No	NA	No	Yes	No	No	No	No	No	2	No	
P2	Yes	Yes	No	No	No	No	Yes	NA	No	Yes	No	No	No	No	No	2	No	
P3	No	No	No	No	No	No	Yes	NA	No	No	P	No	No	No	P	3	No	
P4	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No	No	No	Yes	No	3	No	
P5	Yes	Yes	No	No	No	Yes	Yes	NA	NA	Yes	P	No	No	Yes	No	3	No	
P6	Yes	Yes	Yes	Yes	Yes	No	No	NA	NA	Yes	NA	No	No	Yes	Yes	5	No	
P7	Yes	Yes	Yes	Yes	Yes	No	No	NA	NA	Yes	NA	No	No	Yes	Yes	5	No	
P8	No	No	No	No	No	Yes	Yes	NA	No	No	No	No	No	Yes	P	3	No	
P9	Yes	Yes	No	No	No	No	No	NA	No	Yes	No	No	No	Yes	Yes	4	No	
P10	Yes	Yes	No	No	No	No	No	NA	NA	No	No	No	No	Yes	No	2.5	No	

Note: Cx, criterion; 1. Name of the individual or organization responsible for the website; 2. Email or physical address responsible for the website; 3. Specification of the website's purpose or objective; 4. Specification of the target population(s); 5. Specification of the funding sources for the development or maintenance of the website; 6. Declaration of the sources of information; 7. Date of publication; 8. Description of the protection method for information regarding a natural person (identified or identifiable) and data processing; 9. Description of the information update procedure; 10. Is there a contact email address to which comments and suggestions can be sent (webmaster) or another option for contacting the entity responsible for the webpage?; 11. In the event an online health-related consultation service is offered, do they delivery what they offer?; 12. Editorial policy. Declaration of the procedure for selecting content; 13. Editorial policy. Declaration of the procedure for selecting links; 14. Ease in finding content; 15. Ease in performing searches; 16. Readability; 17. Accessibility for individuals with disability or learning difficulties; P, partial or doubtful; NA, not applicable. The four webpages that were not assessed ceased to be available during the assessment process.

such as Angola, Mozambique and especially Brazil, which is the most populated nation of Ibero-America (<https://www.infoidiomas.com/blog/14207/los-idiomas-mas-hablados-del-mundo-en-2022/>).

In terms of worldwide market share for the main search engines from January 2010 to 2020, Google (87.35%) is the industry leader, followed by Bing (5.53%) and Yahoo (2.83%) (<https://es.statista.com/estadisticas/634462/share-of-market-worldwide-of-the-motor-of-see/>). A survey conducted between April 2021 and March 2022 in Latin America on individuals older than 18 years concluded that Google was the most widely used browser by Internet users in Brazil (98%), Mexico (97%), Argentina (96%), and Chile (95%) (<https://es.statista.com/grafico/25105/motores-de-busquedas-mas-usados-en-latinoamerica/>). Our study therefore used Google and Bing as the search engines.

There are numerous assessment tools for online information on health issues, although their efficacy in identifying more trustworthy and better quality information has not yet been conclusively demonstrated nor has a universal qualification instrument been developed due to the considerable heterogeneity of the available information.<sup>22</sup> The combined use of several assessment tools is therefore justified, as we have done in our study.

DISCERN is a reliable instrument that was initially designed to assess the quality of written health information.<sup>17</sup> However, the tool has also been frequently used to assess the content of health-related webpages<sup>23</sup> and has recently been applied to assess information obtained through artificial intelligence on oral medicine conditions.<sup>24</sup> The results of this study suggest that there are very few webpages that meet the standards required by the DISCERN tool, with a mean quality of low to moderate for the available information. This finding coincides with those of previous publications, which have suggested that the quality of health information available online regarding dentistry is in general poor or very poor in disciplines as diverse as cariology,<sup>25</sup> dental trauma,<sup>26</sup> endodontics,<sup>27</sup> orthodontics<sup>28</sup> and, as in this study, oral complications of certain systemic diseases.<sup>29</sup>

In terms of the results of applying the QEEC, the lowest-rated questions referred to the informational aspects of the webpages more than to their content. Specifically, the questions referred to the revealing of funding sources for developing or maintaining the website (such as assistance, sponsors, nonprofit advertising and volunteer contributions) and to the transparency in the declaration of the procedure employed for selecting links. From this analysis, we can conclude that the identified areas for improvement are those corresponding to the strengthening of the website's credibility by providing detailed information on the sources used to collect the information.

The presence of a trust seal such as HONcode and AMW is an indicator of the trustworthiness of a website. None of the webpages included in this study had any of these seals. The fact that the selected websites were aimed at the general public and not specifically at medical personnel might explain the absence of trust seals. Although a number of authors have indicated that the HONcode is one of the most widely used website assessment tools,<sup>22</sup> a previous publication that analyzed the available online information on harmful oral habits showed that the presence of the HONcode did not reach 10% of the analyzed webpages.<sup>30</sup> The omission of these seals does not mean that the reviewed websites lacked reliability, especially considering that obtaining the seals requires a specific request and entails a cost.<sup>31</sup> In any case, the HON website and certification review program is no longer maintained (since December 15, 2022).

The implementation of comprehensive dental care plans adapted to the specific needs of patients with DS that eliminate all barriers and challenges faced by their caregivers has been highly recommended.<sup>32</sup> To this end, it is essential to facilitate adequate and timely information on the oral health of individuals with DS starting from their first years of life.<sup>33</sup> Although webpages can be a valuable source of information, they are currently an underused tool, at least in Spanish and Portuguese.

This study is not exempt from a number of limitations that prevent the generalization of the results, such as those inherent in selecting languages or those resulting from the quality assessment instruments themselves such as DISCERN, which is not applicable for assessing graphical elements, figures or photographs.<sup>34</sup>

## 5 | CONCLUSIONS

The content available online in Spanish and Portuguese regarding DS and odontology is scarce and of highly questionable quality and could even provide erroneous information and generate false expectations in these patients' settings. It is imperative to develop webpages with specific high-quality content, in a language that is accessible to individuals who are not health professionals and that serves to facilitate dental care for individuals with DS in Ibero-American countries.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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