

Online quality and readability assessment of Early childhood caries information available on websites from distinct countries: A cross-sectional study



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DOI 10.23804/ejpd.2022.23.01.03

Abstract

Aim To assess the quality and readability of ECC-related Web information available in English, Spanish, and Brazilian Portuguese language.

Methods This study assessed the quality and readability of information related to ECC in three different languages found on the most popular Internet search engines worldwide. Websites were retrieved from different search engines using specific strategies. DISCERN questionnaire, JAMA benchmark criteria, and language-based readability formulas were used by two independent investigators to evaluate the quality and readability of websites. Also, contents were categorised according to aetiology, prevention, and treatment of ECC. The statistical analysis was performed using Spearman's rank correlation coefficient, hierarchical clustering analysis by Ward's minimum variance method, and Mann-Whitney U test. P values < 0.05 were considered significant.

Results Digital contents of 177 websites were considered of easy readability and low quality, without differences between websites produced by health- or non-health-related authors. Also, websites with ≥ 3 categories of information, or those that recommended dental visits or fluoride toothpastes presented higher DISCERN scores than their counterparts.

Conclusion ECC-related digital contents were considered simple, accessible and of poor quality, independently of their language and authorship. These findings indicate the importance of professional counseling to empower parents in selecting and consuming adequate information towards the improvement of children's oral health

cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six" [Pitts et al., 2019]. It impacts children's and families' quality of life due to its negative consequences, such as chronic pain, infections, sleeping disorders, loss of school days, and tooth extraction [Pitts et al., 2019; GBD Oral Disorders Collaborators et al., 2020]. In theory, these specific problems and circumstances lead parents and caregivers to recognise the need for a particular information, e.g., recommendations for the management of ECC [Yardi et al., 2018].

Although physicians are still the number one source of health information [Ipsos, 2018], the sense of self-efficacy in relation to selfcare [Bandura, 1988], next to the Internet's pervasiveness, could trigger parents and caregivers' seeking behaviour for online oral health consultations as means to fulfill their needs for information by themselves. Nevertheless, the access to digital health-related mis- or dis-information could hamper the primary prevention of ECC, because of their respective unintentional or deliberated incompleteness, uncertainty, or ambiguity natures [Stahl, 2006], in combination with the challenges represented for socially marginalised young parents in assessing the quality of information [Greyson, 2018]. Additionally, low-quality information could negatively impact on the person-professional relationship, especially among individuals who ignore the expertise of dentists for conflicting with their own beliefs confirmed with what was found online [Tan and Goonawardene, 2017; Glick, 2017].

Based on the aforementioned reasons, the aim of this study was to analyse the quality and readability of ECC-related information available on the Internet.

KEYWORDS Early Childhood Caries; Prevention; Health behaviour; Quality of information; Internet; eHealth.

Methods

Design

The present study assessed the quality and readability of information related to ECC in three different languages (English, Spanish and Brazilian Portuguese) found on the most popular Internet search engines worldwide. Two instruments

Introduction

Early childhood caries (ECC) is a chronic disease defined as "the presence of one or more decayed (non-cavitated or

were used to analyse the quality of information, the DISCERN questionnaire and the Journal of American Medical Association (JAMA) benchmark criteria. For the readability analysis, specific metrics were used for each language. Websites were categorised regarding to their content and dichotomised according to the nature of their authorship, recommendation of fluoride toothpaste usage and dental visits.

Since federal regulations consider that research using publicly available data does not involve human subjects, this protocol did not require institutional review board approval from the Council of Ethics in Human Research of the Bauru School of Dentistry, University of São Paulo (Brazil). The present study followed the STrengthening the Reporting of OBservational Studies in Epidemiology (STROBE) checklist for cross-sectional studies.

Search strategy and data collection

First, all cookies and history browser were cleared of the computer used for research prior data collection. Then, country and language were selected on the browser's advanced section for each language studied: United States for English, Mexico for Spanish, and Brazil for Portuguese; otherwise, results could be influenced by the automated set up region. Three Internet search engines were used to retrieve the websites according to the market share by country [Statcounter, 2019; Statcounter, 2019b; Statcounter, 2019a]. A search strategy was constructed by the association of the most commonly used terms related to ECC. For that, a list of terms in each language was tested in the Google Trends tool to convey those with the most volume of interest. Then, several strategies associating different terms were consulted until the development of a final strategy based on the higher number of results retrieved. Final data collection was performed on February 7th, 2019 using the strategies ["infant tooth decay" + "nursing bottle tooth decay"] for retrieving English websites, ["caries de bebe"] for retrieving Spanish websites, and ["cárie em bebê" + "cárie de mamadeira" + "cárie de mamadeira"] for retrieving Brazilian Portuguese websites. Websites with access difficulties (link errors), academic information (scientific papers), video links, journal news, duplicates, and nonspecific sources (Q&As, propagandas, pictures, etc.) were excluded. Before the assessment, all links were registered on archive.today (<http://archivetoday.com/>), an online archiving system that allows web material to remain unaltered for future evaluation.

Categorisation of websites

All websites were dichotomised according to the nature of the authorship in health- (dental professionals, clinics, universities and health companies) or non-health-related authors (blogs and others), the diversity of contents regarding aetiology, prevention, and treatment of ECC (higher = detection of 3 issues; lower = detection of 2 or less issues), the recommendation of fluoride toothpaste usage (yes/no), and the recommendation of dental visits (yes/no).

Quality assessment

Two instruments were used for the quality assessment. The JAMA benchmark consists of the identification of four concepts on the website: authorship (author's name, affiliations, and credentials), attribution (effective references of content), currentness (presence of dates of posts and updates of information), and disclosure (the statement of any potential conflicts of interest) of websites, granting 1 point

for each criterion fulfilled, with a total score of 0 to 4) [Silberg et al., 1997].

The DISCERN instrument is a standardised questionnaire consisting of 16 Likert-scale questions, where 1 represents not meeting the criteria and 5 completely meets the criteria, divided into three sections: the first section describes the reliability of the content (questions 1 to 8), the second section analyses the information regarded treatment options (questions 9 to 15), and the third section represents an overall assessment of the website (question 16). Only the results of the first and second sections are commonly used to determine the quality of information of written materials, categorised in very poor (scores between 15 and 26), poor (27 to 38), fair (39 to 50), good (51 to 62), and excellent (63 to 75) [Charnock et al., 1999].

Two examiners independently assessed all websites (PEAA and IA). Regarding both instruments, when a divergent judgment was observed between the examiners, the website was re-assessed to the achievement of a consensus score.

Readability

The readability measures indicate the reading difficulty of a text based on specific metrics, such as average sentence length (ASL) and average number of syllables per word (ASW). Those metrics were collected from the online tool Readable.io (Readable.io, Bolney, England) through the Uniform Resource Locator (URL) of the website or the direct input of the texts in the platform.

Specific metrics for each language were used in this study. The Flesch Reading Ease (FRE) and the Flesch-Kincaid Grade Level (FKGL) are common metrics used to evaluate the grade of difficulty of English texts [Flesch, 1948; Kincaid et al., 1975]. The formulas predict the level of education that a person requires to understand a specific text: $FRE = 206.835 - (1.015 \times ASL) - (84.6 \times ASW)$. A text scored between 90 and 100 is considered easily understandable by an average 5th grader. Scores between 60 and 70 indicate a text easily understandable by 8th and 9th graders, while scores between 0 and 30 are related to difficult texts, understandable only by graduates. The FKGL scores are equivalent to the US grade level of education that the reader needs to be able to comprehend written contents: $FKGL = 0.39 (\text{average number of words per sentence}) + 11.8 (\text{average number of syllables per word}) - 15.59$. The Fernández-Huerta Readability Formula (FHRF) is a modified version of the Flesch Reading Ease formula for Spanish texts in which 0 is the score for the greatest difficulty and 100 is the score for the easiest reading, similarly to FRE (Fernandez Huerta, 1959). Its formula is expressed as $FHRF = 206.84 - (0.6 \times \text{number of syllables per 100 words}) - (1.02 \times \text{number of sentences per 100 words})$. Brazilian Portuguese contents were evaluated by the Brazilian Portuguese version of the Flesch Reading Ease (FRE-BP): $FRE-BP = 248.835 - (84.6 \times \text{syllables per word}) - (1.015 \times \text{words per sentence})$. The reading difficulty of written materials is indicated by the scores in very easy (75-100), easy (50-75), difficult (25-50), and very difficult (0-25) [Martins et al., 1996].

Data analysis

All data were analysed with the Statistical Package for Social Science (v 25.0; SPSS, Chicago, USA). The internal consistency of DISCERN was determined by Cronbach alpha. The interexaminer reliability was determined by the intraclass correlation coefficient (ICC) for absolute concordance to DISCERN and JAMA scores. The correlations between distinct

measures were demonstrated by the Spearman rank correlation coefficients. The websites of distinct dichotomised natures were compared by Mann-Whitney U test. The quality measures of different countries were compared by Kruskal Wallis and Dunn's post-hoc tests. P values < 0.05 were considered significant for all analyses.

Results

A total of 297 websites were collected among the three languages, excluding 120 links due to link errors (n = 35), academic source (n = 23), video links (n = 6), news (n = 19), duplicates (n = 10) and nonspecific sources (n = 27). Finally, 177 links met the criteria for evaluation (English n = 64, Spanish n = 41, and Brazilian Portuguese n = 72). Details of exclusion criteria by language are shown on Figure 1.

DISCERN and JAMA benchmark presented good internal consistencies (Cronbach's alpha= 0.729 and 0.677, respectively). The inter-examiner reliability was excellent for both instruments (DISCERN ICC=0.81, 95% CI: 0.72-0.87; JAMA benchmark ICC=0.80, 95% CI: 0.74-0.85).

In an overall analysis, the mean of DISCERN indicated a very poor quality of information for the three languages (24.79±4.66) in concordance with the JAMA benchmark (1.38±0.96). In total, 75.10% of the websites were classified as very poor quality of information, 22.60% were classified as poor quality of information and only 2.30% as fair quality of information. There were no websites classified as either good or excellent quality of information. Also, the sum of partial DISCERN scores (sections 1 and 2) were fair correlated with the scores of section 3 ($p=0.55$, $P<0.001$). Regarding to JAMA criteria, only one website published in Portuguese presented the maximum score (JAMA = 4). Ninety-four websites (53.11%) showed information related to the authorship, affiliations or credentials, 143 websites (80.79%) did not reference the content, 97 websites (54.80%) dated the information posted, and only 19 websites (10.73%) stated any potential conflict of interest. DISCERN and JAMA benchmark were weakly positive correlated ($p=0.25$, $P<0.001$).

Table 1 depicts the descriptive statistics of quality and readability scores according to distinct languages. The mean of FRE (63.65±7.44) and FKGL (7.85±1.61) for English websites indicated accessible and plain texts, easily understood by 7th – 8th graders. Only 2 websites were measured as difficult to read. The mean of Fernandez-Huerta formula (67.37±11) showed that Spanish websites were easy to read. Only 5 websites were considered difficult and 2 were considered very easy to read. Finally, the FRE-BP demonstrated that Brazilian Portuguese websites were accessible and easy to understand (58.83±8.47). Overall, quality and readability scores were not correlated significantly, except to Fernández-Huerta that showed weak negative correlations with DISCERN ($S1 + S2$) ($p = -0.430$, $P<0.001$) and JAMA scores ($p = -0.402$, $P<0.001$).

A total of 49.20% websites were related to health authors, 24.90% recommended fluoride toothpaste usage, and 71.80% indicated dental visits. Regarding specific languages, most websites published in Spanish (68.30%) and Brazilian Portuguese (59.70%) were developed by non-health authors, whereas 70.30% of websites published in English were developed by health-related authors. The DISCERN scores were significantly higher among websites that recommended fluoride toothpaste usage and dental visits in comparison to

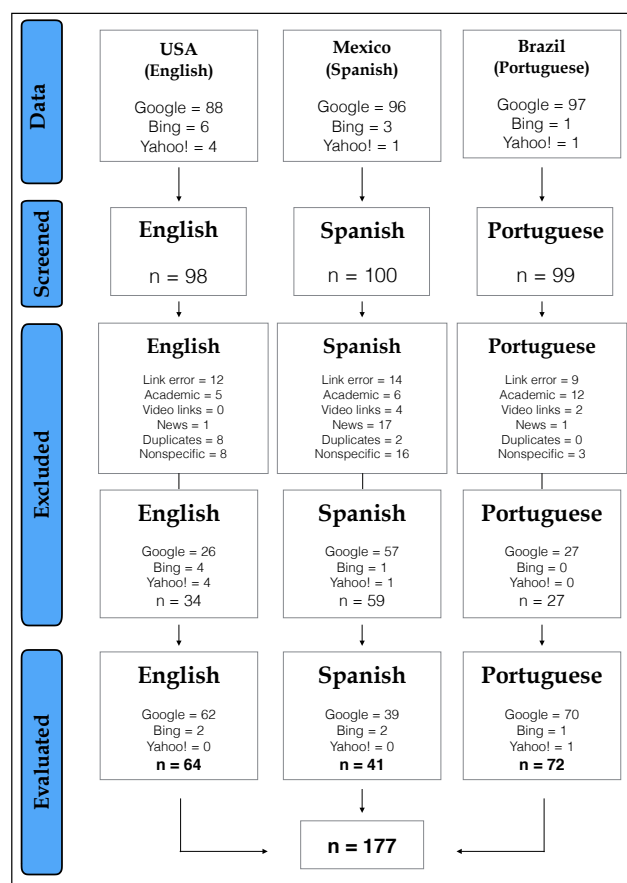


FIG. 1 Flowchart depicting the systematic selection of ECC-related websites by language.

their counterparts. On the other hand, the authorship of websites did not significantly influence the quality of information (Table 2).

Most websites referred to etiology (94.40%) and prevention of ECC (96.60%), and only 17.50% described treatment options for the disease. DISCERN scores were significantly higher in websites of higher diversity contents in comparison with their counterparts, independently of country/language (Table 2).

Discussion and conclusion

To the best of our knowledge, this is the first study that evaluated the quality of ECC-related information in different languages. Our findings showed a predominance of accessible, understandable, and low-quality content on the Internet, independently of the country and language, although the quality of information and their readability were only slightly negatively correlated in Spanish websites. Interestingly, the nature of the authorship did not influence the results, i.e., the quality of information produced even by health-related authors was also very poor. On the other hand, contents with higher diversity presented a better-quality level of information in all languages. In general, websites recommending the use of fluoride dentifrices and dental visits were better qualified than their counterparts. These results presented a good interexaminer reliability and internal consistency as proven

	Outcomes	S1 ^a	S2 ^a	S3 ^a	DISCERN (S1+S2) ^a	JAMA ^b	FKGL ^c	FRE ^d	FH ^e	FRE-BP ^f
Overall	Mean (SD)	15.94 (2.98)	8.84 (2.80)	1.93 (0.61)	24.79 (4.66)	1.38 (0.96)	-	-	-	-
	Median	16	8	2	24	1	-	-	-	-
	Minimum	9	3	1	16	0	-	-	-	-
	Maximum	27	21	4	44	4	-	-	-	-
USA (English)	Mean (SD)	16.05 (2.94)	9.25 (3.03)	2.59 (0.61)	27.13 (5.63)	1.09 (1.05)	7.85 (1.61)	63.65 (7.44)	-	-
	Median	15.50	8.50	3	26	1	7.8	65.45	-	-
	Minimum	12	7	2	20	0	5	38	-	-
	Maximum	27	21	4	47	3	12	78	-	-
Mexico (Spanish)	Mean (SD)	15.61 (2.87)	9.22 (3.59)	2.41 (0.63)	24.83 (5.05)	1.46 (0.87)	-	-	67.37 (11)	-
	Median	15	8	2	24	2	-	-	67.29	-
	Minimum	9	3	1	16	0	-	-	43.34	-
	Maximum	23	21	4	40	3	-	-	94.98	-
Brazil (Portuguese)	Mean (SD)	16.04 (3.11)	8.26 (1.86)	1.97 (0.53)	24.31 (3.80)	1.58 (0.88)	-	-	-	58.83 (8.47)
	Median	16	7	2	23.50	2	-	-	-	59.32
	Minimum	9	7	1	18	0	-	-	-	33.24
	Maximum	27	15	3	36	4	-	-	-	75.20

^aS1, S2, and S3: 3 different sections of DISCERN.
^bJAMA: The Journal of American Medical Association.
^cFKGL: Flesch Kincaid Grade Level
^dFRE: Flesch Reading Ease
^eFH: Fernandez Huerta readability metric
^fFRE-BP: Flesch Reading Ease adapted to Brazilian Portuguese.
 Significant statistical differences between the groups (Mann-Whitney U test, $P < .05$).

TABLE 1 Descriptive statistics of scores of DISCERN, the Journal of American Medical Association benchmark, Flesch Reading Ease adapted to Brazilian Portuguese, Fernandez Huerta, Flesch Kincaid Grade Level and Flesch Kincaid Reading Ease by language.

with a previous study [Aguirre et al., 2017].

The almost ubiquitous availability of the Internet permitted the easy access to information, defeating spatial and temporal barriers. Not surprisingly, online search engines represent the second most used source for health information among adults worldwide [Ipsos, 2018]. Parents and caregivers who refer to websites for information regarding their children's health could rely on the content they found [Kubb and Foran, 2020], especially if it confirms something they already believe, read or heard before [Meppelink et al., 2019]. Hence, the lack of quality control of Web information could jeopardise user's health condition based on poor-quality contents [Kubb and Foran, 2020]. In this sense, a challenge sets when the internet is filled with blogs consisting in experiences, health beliefs and opinions regarding ECC exposing their readers to misinformation, e.g. "...avoid fluoride toothpastes because they are toxic".

Since the production of good quality information is a complex and arduous task, which involves the need of skilled specialists, trained to attain target audiences and produce accessible contents according to specific guidelines and instruments, the poor quality of information authored by health professionals might indicate their technical incapacity combined with a primary interest in producing oral health information for advertisements and commercial profit, linked to a possible marketing sense of obligation in developing a website for describing treatments to their patients [Mourad et al., 2020]. It can be confirmed by a great volume of content replication found among diverse websites. Indeed, professionals seemed to be unconscious about their responsibility in producing good quality educational information to stimulate healthy behaviours; instead, they are more concerned to show their current practice describing procedures not necessarily committed to the evidence-based

dentistry. In addition, the better qualification of more diverse information emphasizes the importance of previous knowledge and professional planning to achieve contents of adequate educational performance [Kulasegarah et al., 2018].

Although dental caries is the most prevalent disease in the world (GBD Oral Disorders Collaborators et al., 2020), its impact in children could still be disregarded. For instance, oral health education during pregnancy [Paglia, 2019], the need of early dental visits, the importance of the maintenance of primary teeth for adequate oral and general health conditions are probably overlooked by parents [Colombo et al., 2019]. In this scenario, most websites described information related to natural breastfeeding, formulas and dental hygiene as formal "protocols" or steps that should be followed by parents. Hypothetically, strict non-individualised recommendations could dissuade parents and caregivers towards good oral health habits for not fitting in their own routines and lifestyles [Ferrazzano et al., 2019; Lotto et al., 2020].

The consumption of digital contents empowers people to discuss diverse aspects of their own health during the shared decision-making, causing possible negative effects on the relationship with professionals when based on beliefs and misinformation [Kubb and Foran, 2020]. In this scenario, when health professionals are welcoming towards their patients' Internet retrievals, patients are more positive about their relationship, otherwise they seemed challenged facing a negative perception, especially if they have concerns about the quality of the information gathered [Tan and Goonawardene, 2017]. Acknowledging the vast volume of oral health misinformation online and, moreover, the challenges that represent for parents to appraise good quality of information [Greyson, 2018], health professionals have the responsibility to guide their patients toward clear and accurate

			S1*	S2*	S3*	DISCERN(S1+S2)	JAMA†	FKGL‡	FRE§	FH¶	FRE-BP#
Overall	Authorship	Health	15.74 (2.59) ^a	8.87 (2.22) ^a	1.90 (.61) ^a	24.61 (3.89) ^a	1.33 (.97) ^a	-	-	-	-
		Non-health	16.14 (3.32) ^a	8.81 (3.28) ^a	1.96 (.62) ^a	24.96 (5.32) ^a	1.42 (0.96) ^a	-	-	-	-
	Diversity of contents	Higher	16.93 (3.78) ^a	12.37 (3.99) ^a	2.44 (0.64) ^a	29.30 (6.41) ^a	1.56 (1.01) ^a	-	-	-	-
		Lower	15.77 (2.79) ^a	8.21 (1.96) ^b	1.83 (0.56) ^b	23.97 (3.76) ^b	1.35 (0.96) ^b	-	-	-	-
	Dental visits	Yes	16.27 (3.17) ^a	9.17 (3.01) ^a	1.96 (0.62) ^a	25.44 (5.05) ^a	1.43 (0.93) ^a	-	-	-	-
		No	15.12 (2.27) ^a	8.00 (1.97) ^b	1.84 (0.58) ^b	23.12 (2.93) ^b	1.24 (1.04) ^b	-	-	-	-
USA (English)	Authorship	Health	17.39 (3.16) ^a	9.34 (3.16) ^a	2.14 (0.63) ^a	26.73 (4.62) ^a	1.70 (0.93) ^a	-	-	-	-
		Non-health	15.47 (2.77) ^b	8.68 (2.67) ^b	1.86 (0.59) ^b	24.14 (4.51) ^b	1.27 (0.95) ^b	-	-	-	-
	Diversity of contents	Higher	15.36 (2.22) ^a	8.73 (2.05) ^a	1.80 (0.59) ^a	24.09 (3.58) ^a	1.02 (0.89) ^a	7.91 (1.56) ^a	64.11 (5.50) ^a	-	-
		Lower	17.68 (3.77) ^b	10.47 (4.45) ^b	2.21 (0.92) ^b	28.16 (7.32) ^b	1.26 (1.37) ^b	7.72 (1.77) ^b	62.57 (10.74) ^b	-	-
	Dental visits	Yes	17.33 (4.47) ^a	12.56 (4.39) ^a	2.67 (0.71) ^a	29.89 (8.19) ^a	1.56 (1.13) ^a	8.24 (1.54) ^a	58.39 (11.08) ^a	-	-
		No	15.84 (2.61) ^a	8.71 (2.41) ^b	1.80 (0.65) ^b	24.55 (4.29) ^b	1.02 (1.03) ^b	7.79 (1.63) ^b	64.51 (6.40) ^b	-	-
Mexico (Spanish)	Authorship	Health	16.52 (3.07) ^a	9.58 (3.25) ^a	2.00 (0.72) ^a	26.10 (5.61) ^a	1.19 (1.02) ^a	7.75 (1.72) ^a	64.33 (7.40) ^a	-	-
		No	14.62 (2.00) ^b	8.25 (2.05) ^b	1.69 (0.70) ^b	22.88 (3.10) ^b	0.81 (1.10) ^b	8.18 (1.22) ^b	61.63 (7.43) ^b	-	-
	Diversity of contents	Yes	18.62 (2.87) ^a	10.54 (3.46) ^a	2.46 (0.66) ^a	29.15 (5.03) ^a	1.77 (1.09) ^a	7.20 (1.73) ^a	65.22 (9.86) ^a	-	-
		No	15.39 (2.60) ^b	8.92 (2.87) ^b	1.78 (0.67) ^b	24.31 (4.91) ^b	0.92 (0.98) ^b	8.02 (1.56) ^b	63.25 (6.75) ^b	-	-
	Dental visits	Yes	15.31 (2.75) ^a	9.92 (2.96) ^a	1.92 (0.64) ^a	25.23 (4.59) ^a	1.54 (0.88) ^a	-	-	69.20 (12.25) ^a	-
		Non-health	15.75 (2.96) ^a	8.89 (3.85) ^a	1.82 (0.55) ^a	24.64 (5.32) ^a	1.43 (0.88) ^a	-	-	66.52 (10.49) ^a	-
Brazil (Portuguese)	Authorship	Health	15.80 (1.92) ^a	15.60 (5.55) ^a	2.60 (0.55) ^a	31.40 (6.91) ^a	1.20 (0.84) ^a	-	-	68.65 (10.23) ^a	-
		Non-health	15.58 (3.00) ^a	8.33 (2.14) ^b	1.75 (0.50) ^b	23.92 (4.08) ^b	1.50 (0.88) ^b	-	-	58.13 (13.14) ^b	-
	Diversity of contents	Higher	15.81 (2.82) ^a	9.48 (3.79) ^a	1.81 (0.60) ^a	25.29 (5.31) ^a	1.55 (0.81) ^a	-	-	64.65 (9.55) ^a	-
		Lower	15.00 (3.09) ^a	8.40 (2.88) ^a	2.00 (0.47) ^a	23.40 (4.03) ^a	1.20 (1.03) ^a	-	-	75.78 (11.36) ^b	-
	Dental visits	Yes	17.25 (1.82) ^a	9.58 (4.36) ^a	2.00 (0.60) ^a	26.83 (4.30) ^a	1.33 (0.89) ^a	-	-	64.04 (8.30) ^a	-
		No	14.93 (2.98) ^b	9.07 (3.29) ^b	1.79 (0.56) ^b	24.00 (5.17) ^b	1.52 (0.87) ^b	-	-	68.75 (11.79) ^b	-
Brazil (Portuguese)	Authorship	Health	16.52 (2.94) ^a	8.62 (2.04) ^a	2.03 (0.63) ^a	25.14 (4.04) ^a	1.72 (0.19) ^a	-	-	-	58.04 (8.61) ^a
		Non-health	15.72 (3.21) ^a	8.02 (1.71) ^a	1.93 (0.46) ^a	23.74 (3.56) ^a	1.49 (0.12) ^a	-	-	-	59.37 (8.43) ^a
	Diversity of contents	Higher	17.08 (3.97) ^a	11.00 (2.24) ^a	2.23 (0.60) ^a	28.08 (4.96) ^a	1.69 (1.03) ^a	-	-	-	56.55 (8.87) ^a
		Lower	15.81 (2.87) ^a	7.66 (1.08) ^b	1.92 (0.50) ^b	23.47 (2.94) ^b	1.56 (0.86) ^b	-	-	-	59.34 (8.37) ^a
	Dental visits	Yes	16.31 (3.50) ^a	8.56 (1.99) ^a	2.02 (0.53) ^a	24.87 (4.25) ^a	1.60 (0.87) ^a	-	-	-	58.95 (8.11) ^a
		No	15.50 (2.06) ^a	7.67 (1.44) ^b	1.88 (0.54) ^b	23.17 (2.35) ^b	1.54 (0.93) ^b	-	-	-	58.62 (9.31) ^a
Brazil (Portuguese)	Fluoride toothpaste usage	Yes	16.63 (3.83) ^a	8.37 (1.50) ^a	2.00 (0.58) ^a	25.00 (3.93) ^a	1.89 (0.81) ^a	-	-	-	56.44 (1.55) ^a
		No	15.83 (2.81) ^a	8.23 (1.99) ^a	1.96 (0.52) ^a	24.06 (3.75) ^a	1.47 (0.89) ^a	-	-	-	59.69 (1.22) ^a

*S1, S2, and S3: 3 different sections of DISCERN.

†The Journal of American Medical Association.

‡Flesch Kincaid Grade Level.

§Flesch Reading Ease.

¶Fernandez-Huerta.

#Flesch Reading Ease adapted to Brazilian Portuguese.

Figure legend

TABLE 2 The comparison of means (SD) of quality and readability scores between dichotomised categories of websites published in distinct languages. Different superscript letters represent significant statistical differences between dichotomised categories regarding the same quality and readability measure (Mann-Whitney U test, $P < 0.05$).

information, encouraging them to discuss their findings, especially when conditions such as ECC are behaviour dependent [Pitts et al., 2019]. To improve health literacy levels, the greater and frequent involvement with health information should be stimulated, enhancing their proper capability in dealing with contents. Therefore, online search techniques as clicking restraint and lateral reading should be instructed to support consumers in the analysis of the veracity of information [Wineburg and McGrew, 2019]. It consists in analyzing thoroughly the links depicted before selecting a website, scanning a webpage without diving completely in its content and opening new tabs laterally regarding the same subject to compare results. Also, triangulation is a method used by researchers to cross-check information consulting different perspectives and sources [Barnes and Vidgen, 2006], including the use of escalation of authorities to verify any information, e.g. hearing information about parenthood, consulting first with the Internet, discussing it within their inner circle, to finally verify it with their health care provider [Greyson, 2018]. Altogether, these techniques emphasise the need to consult different sources to confirm an information of interest. In addition, the production of good quality educational contents, although a challenging task, is critical to tackle misinformation. Important aspects must be considered before the production of health content, e.g., the disclosure of objectives, authorship, references that could be listed under the main text [Winker et al., 2000], and dates of

first posting and updates shown to avoid possible hazards for health information consumers when reading information out of date (National Library of Medicine-NIH, 2018).

The present study has some limitations. First, although the total score could have been influenced by the section 2 of the DISCERN questionnaire, when a website did not provide information regarding treatment options, the independent analysis of sections 1 and 3 also corroborated with the same classification of poor quality of information. Second, although other populations are also native speakers of these three languages, the core of quality of ECC-related information presented here must be regarded specifically by selected countries, since other websites could be available for distinct geographical areas. Third, both assessment instruments were developed to assess the quality of only textual contents, i.e., graphic elements, figures and pictures were disregarded in this evaluation. For the same reason, 7.72% links related to scientific papers were also excluded from this analysis; however, it is presumed that lay readers would have a limited interest in formal contents, especially due to their difficult in understanding technical language and terms.

In conclusion, the information related to ECC published in websites of Brazil, Mexico, and USA were considered of poor quality, presenting accessible and simple contents for most population. The awareness on what parents and caregivers are exposed to when searching for ECC online could be a relevant approach to improve the management of the disease,

considering that the information influences the parental decision-making process decisively. Therefore, paediatric dentists should receive sufficient technical formation and stimulation to produce Web contents directly to parents and children, focused on the spread of information related to good oral health habits for the prevention and control of ECC.

Acknowledgements

This research was funded by the São Paulo Research Foundation (#2018/02563-6). The funder had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Conceived and designed the study: PEAA, AFPC, TC. Acquired the data: PEAA, IA, TC. Analyzed and interpreted the data: PEAA, IA, TC. Drafted and critically revised the manuscript: PEAA, IA, APS, ML, VLR, AFPC, DR, TC.

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