PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Online information in Spanish on probiotics, yoghurt, kefir, kombucha, fibre and prebiotics: an analysis of the quality of information and the certainty of the evidence supporting health claims
AUTHORS	Prados-Bo, Andreu; Rabassa, Montserrat; Bosch, Mireia; Casino, Gonzalo

VERSION 1 – REVIEW

REVIEWER	Rachul, Christen University of Manitoba, Rady Faculty of Health Sciences
REVIEW RETURNED	18-Apr-2022

GENERAL COMMENTS	The authors have presented an interesting study of Spanish websites that discuss popular microbiome related interventions. The article is clear and well written and provides an important perspective on the quality and certainty and evidence for these interventions. I have two primary suggestions to strengthen the article. 1. It would be helpful, for replication purposes, to have more details about how the authors searched for SRs to assess the evidence and effect of the interventions. I am specifically interested in the evidence of the interventions for the specific health claims. For example, was the search for the interventions more generally or for the interventions in relation to specific health claims? Was this search done after the health claims were identified or were the health claims identified in the SRs after they were identified. Knowing how the search was conducted also helps readers to further critique/assess the rigour of the search for evidence. 2. The second suggestion is about the implications of the study. First beyond distorting public perceptions, what are the potential risks or implications of having a distorted perception of microbiome related interventions? Second, the authors suggest in the discussion that the focus should be on promoting critical thinking rather than prevention of misinformation. It is not clear in the article, if the authors are presenting their 10 criteria for assessing information quality as a tool for the public to use or for researchers who engage in similar investigations.

REVIEWER	Montaña Blasco, Mireia Universitat Oberta de Catalunya
REVIEW RETURNED	03-Jun-2022

GENERAL COMMENTS	This study explores the scientific basis and the quality of the online information on gut microbiome-related interventions to which the

	public is exposed. It could be valuable research in light of providing a framework for food marketing regulation, especially on digital platforms. This article scientifically sounds, it's well structured, objectives are well established, and the methodology is clear. Despite this, some formal and orthographic aspects of the manuscript need to review. I also have a few concerns that I think could improve the paper. In the Introduction section, some important contents are missing: . Current legislation on information on web pages of the food sector; . Review of the evidence of the impact of these products on the health of consumers In the Methods section: . It's not clear if you have analyzed 20 web pages (as you say in Methods) or 114) as you say in Results). . Line 50-52. You say "Webpages that were irrelevant (i.e., the main focus was not the searched-for intervention), vídeos lasting more than five minutes, retail sites intended for direct purchase, and advertisements were all excluded". This statement may seem subjective. What criteria did you follow to include or exclude a website? Please detail it well. . In "Quality of information". Line 48. You say "two relevant papers" but there are 3 references (45-47). Please check. In Results: . Line 51. You talk about 113 different Health claims, but is your analysis only quantitative? Do you have any information on what the highlights were? This would also provide interesting information, as a website can often provide a variety of claims, but there is one that stands out. . Table 1. I have some doubts about the "certain of evidence" column. You say it's according to "author's confidence", which is too subjective. This analysis should be redone, referencing the evidence that can confirm this. This table is also too long. Maybe I could go to the annex. Discussion and Conclusion: In my opinion, it's necessary to reference the current legislation on this subject. It would provide a better reflection and it would better develop the ideas of the conclusion, which right now do not end up providing all they could about the risks of these websites for public health. I hope my contributions help you to improve the article. I look forward to reading the final version of the manuscript.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1 - Dr. Christen Rachul:

1) It would be helpful, for replication purposes, to have more details about how the authors searched for SRs to assess the evidence and effect of the interventions. I am specifically interested in the evidence of the interventions for the specific health claims. For example, was the search for the interventions more generally or for the interventions in relation to specific health claims? Was this search done after the health claims were identified or were the health claims identified in the SRs after they were identified. Knowing how the search was conducted also helps readers to further critique/assess the rigour of the search for evidence.

Thank you for acknowledging this point, which will improve the replication of our findings. The search for systematic reviews in both the Cochrane Library and PubMed was done as follows (see reference [56]) and we have provided greater clarification in the Methods section of the manuscript.

The search for SRs of interventions of interest in two databases (PubMed and Cochrane Library) was conducted after the health claims were identified on webpages, so the results found in SRs did not bias the authors' perceptions/opinions when carrying out Google searches.

The first part of the search phrases included the terms related to each intervention (MeSH terms, natural language and their synonyms). The second part included the following filters that allowed for retrieving SRs that specifically assessed the quality of the evidence: certainty OR GRADE approach OR grading quality. For the PubMed searches, the additional filter of "Systematic Review" was selected. The study period went from inception to December 2021, which was when the searchers concluded their work.

Of all the SRs retrieved for each of the six interventions, we focused only on those that assessed the health claims mentioned in webpages. When more than one SR was obtained, we prioritized the most recent and for two SRs published in the same year, we prioritized the Cochrane SR, as stated in the Methods section of the manuscript (see reference [56]).

Please find an example of a complete search phrase for probiotics: (probiotics[mesh] OR probiotics[tiab] OR probiotic[tiab]) AND (certainty[tiab] OR GRADE approach[tiab] OR grading quality[tiab]).

All search phrases used for the search of systematic reviews in the Cochrane Library and PubMed have been included in online supplemental material 3, which is open access for replication purposes: https://figshare.com/articles/journal_contribution/Supplemental_material_3/20204021

2) The second suggestion is about the implications of the study. First beyond distorting public perceptions, what are the potential risks or implications of having a distorted perception of microbiome related interventions? Second, the authors suggest in the discussion that the focus should be on promoting critical thinking rather than prevention of misinformation. It is not clear in the article, if the authors are presenting their 10 criteria for assessing information quality as a tool for the public to use or for researchers who engage in similar investigations.

Thank you for your comments. First, we have updated the Discussion to clarify the implications of having a distorted perception of microbiome-related interventions in terms of safety issues for the patient and a possible delay in a medical diagnosis and the search for an effective treatment. This is due to the fact that dietary interventions that target the gut microbiome are usually regulated as foods or supplements, not drugs, which means they do not need to undergo strict quality controls in their composition and are not usually backed by human studies.

Second, we have clarified in the Discussion section that we are presenting our suggested 10 quality criteria to address three different groups. First, healthcare providers as a tool for recommending reliable webpages for their patients; second, journalists and communicators involved in disseminating microbiome research; and third, the lay public to guide them every time they face a piece of online information related to the gut microbiome.

Reviewer 2 – Mireia Montaña Blasco:

1) Some formal and orthographic aspects of the manuscript need to review.

Thank you for your comment. We have incorporated formal and orthographic changes as detailed in your comments and as requested by the journal editor so the manuscript meets journal needs.

2) In the Introduction section, some important contents are missing:

• Current legislation on information on web pages of the food sector

Thank you for your interesting suggestion. The legislation of information related to food and food supplements is not universal and differs between countries. We have stated in the Introduction section that the marketing of gut microbiome-related foods and dietary supplements is largely unregulated and might contribute to the spread of misleading information about products that are available to consumers. While the authors agree that the weak self-regulation of the food advertising industry may contribute to explaining the inaccuracy of online nutrition information, this regulation only applies to commercial webpages, which represent 23.7% of accessed webpages in our study. We have acknowledged in the Discussion section some references, including two recent original research articles from the reviewer, showing why current food marketing regulation is not enough to prevent nutrition misinformation on the internet and cited current legislation available in Spain (i.e., Regulation No. 1924/2006, Royal Decree 1487/2009 and Regulation No. 1169/2011 that regulate the information on foods and dietary products sold online).

• Review of the evidence of the impact of these products on the health of consumers.

We appreciate the reviewer's relevant contribution to better contextualising the six interventions that are the focus of our manuscript. We have added a new paragraph in the Introduction section to update the health benefits of probiotics, fermented foods, fibre and prebiotics, based on the latest clinical guidelines from the World Gastroenterology Organisation and the American Gastroenterological Association, along with other relevant consensus papers and systematic reviews.

3) In the Methods section:

• It's not clear if you have analyzed 20 web pages (as you say in Methods) or 114 (as you say in Results).

We analysed the first 20 webpages retrieved through Google.es for each intervention (one search phrase for each intervention). Considering that there are six interventions in total, the initial dataset consisted of 120 webpages. After applying the exclusion criteria described in detail in the Methods section, the complete dataset came to 114 webpages. We have rewritten the Methods section to clarify that point.

• Line 50-52. You say "Webpages that were irrelevant (i.e., the main focus was not the searched-for intervention), vídeos lasting more than five minutes, retail sites intended for direct purchase, and advertisements were all excluded". This statement may seem subjective What criteria did you follow

to include or exclude a website? Please detail it well.

All webpages written in the Spanish language, freely accessible (i.e., they did not have paywalls and/or login requirements) and which provided information on each intervention of interest (i.e., probiotics, yoghurt, kefir, kombucha, fibre and prebiotics) were considered eligible. The following webpages were excluded: any irrelevant webpages (i.e., the main focus was not the searched-for intervention), webpages only featuring video content, retail sites intended for direct purchase, and advertisements. The criteria were chosen based on previous studies following a similar methodology to ours for analysing online information about health interventions: Rachul C et al., 2020 (https://bmjopen.bmj.com/content/10/10/e040989), Neunez M et al., 2020 (https://www.frontiersin.org/articles/10.3389/fmed.2019.00296/full), Alioshkin Cheneguin A et al., 2020 (https://bmjopen.bmj.com/content/10/7/e037065), Cassa Macedo A et al., 2019 (https://www.frontiersin.org/articles/10.3389/fmed.2019.00165/full#B15) and Aslam R et al., 2017 (https://www.frontiersin.org/articles/10.3389/fpubh.2017.00090/full). We have better clarified our inclusion and exclusion criteria in the Methods section.

• In “Quality of information”. Line 48. You say “two relevant papers” but there are 3 references (45-47). Please check.

We apologise for the mistake and have corrected it. We have rewritten this line to state that we based our quality criteria on the first systematic review of the quality of information on health interventions (reference 59) and two other relevant papers (references 60 and 61).

4) In Results:

• Line 51. You talk about 113 different Health claims, but is your analysis only quantitative? Do you have any information on what the highlights were? This would also provide interesting information, as a website can often provide a variety of claims, but there is one that stands out.

We appreciate your suggestion. We coded the general health claims related to each intervention (i.e., gastrointestinal health, immune system health, cardiovascular health, cancer, mental disorders, urogenital disorders and other) and specific indications within each health claim topic mentioned in the webpages. We counted as a health claim citation each webpage article in which the general or specific health claim is cited, no matter how many times. Our analysis is only quantitative and, thus, we have an estimate of the type of health claims mentioned across intervention webpages as positioned in the first 20 results, which have a greater chance of being read by the user.

However, we did not focus on whether specific health claims stand out and the context in which they appear (i.e., article title or main body of text). That would require a qualitative content analysis and a study of the discursive strategies used in webpages that, despite being relevant, are outside the scope of our research and would require a different methodology.

In order to have an improved picture of the information portrayed on webpages, beyond coding the stated health claims, we also noted when an article on a webpage made a clear recommendation to consume or avoid the food or supplement and included advice to consult a healthcare provider.

• Table 1. I have some doubts about the “certain of evidence” column. You say it’s according to “author’s confidence”, which is too subjective. This analysis should be redone, referencing the evidence that can confirm this. This table is also too long. Maybe it could go to the annex.

The GRADE methodology (please see references 54 and 55 for an in-depth explanation of how it works) classifies certainty (or quality) of evidence from systematic reviews as high, moderate, low, or

very low, according to factors that include study methodology, consistency and precision of results, and directness of the evidence supporting health claims on webpages. It is not based on subjective expert opinions, but is based on a rigorous, reproducible and transparent assessment of evidence. We have detailed in the Methods section how GRADE works. Please see also reference number 56, in which we applied the GRADE approach to evaluating the certainty of the evidence of nutrition claims disseminated to the public by the media, which is an analogous analysis to that performed in this manuscript.

We agree with the fact that the current Table 1 is long. We have substituted the table with another figure that better summarises our findings and the extended version of the previous table is included as an Excel spreadsheet in the online supplemental material 4, freely available via: https://figshare.com/projects/Online_information_in_Spanish_on_probiotics_yoghurt_kefir_kombucha_fibre_and_prebiotics/135935

5) Discussion and Conclusion: In my opinion, it's necessary to reference the current legislation on this subject. It would provide a better reflection and it would better develop the ideas of the conclusion, which right now do not end up providing all they could about the risks of these websites for public health.

Thank you for your contribution, which allows us to improve the scope of the manuscript. We included in the Discussion section the current legislation on commercial information related to foods and food supplements. As voluntary implementation measures involving the food industry have been largely ineffective, as in the case of preventing childhood obesity, to allow consumers to make informed food choices, we suggest that stricter regulation of gut microbiome-related interventions be made mandatory. Avoiding the practice of scientific societies endorsing prebiotic or probiotic products of dubious health benefits may also help.

At the end of the Discussion section, we state the risks for individuals' health of accessing webpages that feature weakly regulated information on food and food supplements that target the gut microbiome because the products are not classed as drugs.

Please also note that any new references that have been added or older references that have been moved within the text are also marked in red.

VERSION 2 – REVIEW

REVIEWER	Montaña Blasco, Mireia Universitat Oberta de Catalunya
REVIEW RETURNED	18-Jul-2022

GENERAL COMMENTS	This study explores the scientific basis and the quality of the online information on gut microbiome-related interventions to which the public is exposed. It could be valuable research in light of providing a framework for food marketing regulation, especially on digital platforms. This article scientifically sounds, it's well structured, objectives are well established, and the methodology is clear. Despite some of my comments have been taken into account, I still have some concerns:

	In the Introduction section, some important contents are still missing: . Current legislation on information on web pages of the food sector; Results: Figure 1. Prebiotics n=18; but in “10. Quality Criteria” n=20. Please check. In Discussion and Conclusion: I think it's necessary to reference the current legislation on this subject. It would provide a better reflection and it would better develop the ideas of the conclusion, which right now do not end up providing all they could about the risks of these websites for public health.