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Evaluation of the Quality of Online Information About Perinatal Depression in China

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Abstract

This study assessed the quality of Chinese-language websites that provide information about perinatal depression, focusing on their compliance with recognized quality standards, the impact of information content providers on information quality, and the correlation between search engine ranking and quality. We conducted a systematic search on the Baidu search engine and screened 55 relevant websites. The quality of these websites was assessed using the DISCERN instruments. Our findings suggest that the quality of information on websites about perinatal depression is predominantly 'poor', with commercial sites constituting the entirety of the sample, although health information content provided by non-profit organizations demonstrating significantly higher quality. There was a significant negative correlation between search engine rankings and the quality of information on perinatal depression, suggesting that higher quality content is less likely to be searched for and may hinder access to reliable information. This study highlights the urgent need for mechanisms to prioritize the display of high-quality information in search engine results to provide better assistance to Chinese patients with perinatal depression.

Keywords: perinatal depression, information quality, Chinese website, search engine ranking

1. Introduction

Perinatal depression (PND) refers to psychiatric disorders that occur during pregnancy or within the weeks following delivery, although commonly extending up to the first year postpartum in both clinical and research settings. (Bränn et al., 2024; O'Hara & Wisner, 2014). It is a common complication during pregnancy and around delivery, affecting approximately one in four women (Caffieri et al., 2023), with a global pooled prevalence of 26.3% (Al-abri et al., 2023). Perinatal depression is a serious mental health illness involving severe mood swings, anxiety, sleep disturbances, fatigue, and despair (Dossett, 2008). Women with PND are at a higher risk of suicide ideation and attempts, a risk that is particularly pronounced within the first year after diagnosis and can persist for up to 18 years (Yu et al., 2024), and in severe cases can even lead to suicide or infanticide (Stewart & Payne, 2023). In addition to acute mental health crises, women experiencing PND may face health challenges, such as pregnancy complications, and recurrent depressive episodes (Bränn et al., 2024). Notably, the effect of perinatal depression can be extended to their offspring and families. Fan et al. (2024) indicated that perinatal depression was associated with infant and toddler poorer cognitive, language, and motor development. Additionally, maternal depressive symptoms correlate with greater negative impacts on children's mental health post-infancy (Dielemans et al., 2023). Children of mothers with PND are at higher risk of depression, especially childhood depression (Yang et al., 2024). Moreover, maternal perinatal depression is one of the major risk factors for paternal depression (Smythe et al., 2022). These impacts not only harm the health of maternal and their offspring but also place a considerable burden on families and society. Perinatal depression is a public health issue globally, and all countries face the challenge of Perinatal depression (Almond, 2009). In mainland China, the prevalence of perinatal depression is reported at 16.3% with recent studies indicating a gradual uptick in these figures (Nisar et al., 2020).

The search for health information allows health information consumers to gain a deeper understanding of their health issues, manage health problems, make informed decisions, and even change behaviors (Jia et al., 2021). With internet penetration increasing, People are increasingly seeking health information online. Statistics from the National Center for Health Statistics show that 58.5% of American adults in 2022 sought health or medical information online, a trend more pronounced among women(Wang & Cohen, 2022). In China, between 25% to 65% of patients turn to the Internet for health information (Li et al., 2021). Accurate online health information can significantly aid patients by enhancing their understanding of their conditions and guiding them to make appropriate health decisions(Yang & Van Stee, 2022). However, misleading or inaccurate information can result in confusion, treatment delays, or the choice of harmful treatments, in some cases threatening an individual's life (Wang et al., 2019; Wu et al., 2024).

The speed, ease, and convenience of the Internet have made it a favored source for pregnant women and expectant mothers seeking pregnancy-related information (Conrad, 2022). Among the various topics they search online, mental health issues and perinatal depression are of considerable interest (Li et al., 2023). Despite its benefits, the internet is rife with unfiltered and unchecked health misinformation and the quality of health information is low (Wang et al., 2019), a problem that is particularly acute in Asian regions (Varady et al., 2018). Previous research on the evaluation of websites dedicated to perinatal mental health indicates variable quality, often with content that is difficult to comprehend and frequently incomplete (Artieta-Pinedo et al., 2018; Hardman et al., 2022; Kirby et al., 2018). Therefore, there is an urgent need to assess the quality of the information on perinatal depression provided on the website. While previous studies have conducted evaluations of web-based health information concerning perinatal anxiety and perinatal depression, these assessments have predominantly focused on websites in English (Hardman et al., 2022; Kirby et al., 2018). To date, systematic appraisals of the quality of health information presented on Chinese websites dedicated to perinatal depression remain unexplored.

This study assessed the quality of websites featuring Chinese-language information on perinatal depression. Our objectives were to assess the quality of these websites, understand the impact of information content providers on this quality, and examine the correlation between search engine rankings and the quality of information. We hope our findings to inform strategic recommendations to enhance the quality of perinatal depression information on Chinese websites. contribute to the creation of new, high-quality, evidence-based consumer health information, supporting patients in better understanding and managing perinatal depression.

2. Methods

2.1 Procedure

we conducted a search using the term "perinatal depression" on Baidu, the leading search engine in China. To ensure the objectivity of the search results and to avoid personalized recommendations based on big data, we used incognito mode and eliminated all browsing data, including search history, cookies, and cache files. The search was conducted On December 2, 2023, yielding a total of 15,500,000 results. We focused on the first ten pages, where over 95% of Baidu search clicks happen (Duong, 2017). After screening, a total of 55 websites that met the criteria were evaluated in this study. The inclusion criteria were that the content was written in Chinese, related to perinatal depression information, and unrestricted access. We excluded duplicates, news, advertisements, academic articles, forum discussions, unrelated content, and non-readable (e.g., media such as audio or video).

After selection, the non-rater captured screenshots of these websites, which were de-identified and randomized the order before distributing them to the two reviewers. The two reviewers, after aligning on DISCERN criteria through initial discussions and joint reviews, independently rated the sites. The two reviewers extracted information about perinatal depression from selected websites and labelled the attributes of the websites and the health information content providers from the website properties, affiliation statements, and the author profiles.

The attribute of the website was categorized into two types: commercial websites and non-commercial websites. The identity attributes of health information content providers were classified into four categories: non-profit organizations (e.g., government, academic institutions, public hospitals), commercial organizations (e.g., corporations, private hospitals), private individuals (e.g., healthcare professionals, individuals with perinatal depression, and self-published media practitioners), and unspecified (information on authorship attributes was not provided). Website content was recorded on a checklist by two reviewers, with any discrepancies resolved through consensus.

2.2 Quality Evaluation

We evaluated the quality of information on perinatal depression on selected websites using the DISCERN instrument, which is reliable and valid for assessing the quality of consumers' written health information (Charnock et al., 1999). This tool has proven to possess robust validity and reliability, as evidenced by its application in recent studies to gauge the quality of online health information across various topics, including but not limited to, perinatal anxiety, knee

osteoarthritis, and breast cancer disease (Artieta-Pinedo et al., 2018; Goff et al., 2023; Hardman et al., 2022; Li et al., 2021). DISCERN employs a grading system of 16 items rated on a five-point scale (1= not at all; 5=completely). The composite DISCERN score, ranging from 16 to 80, reflects the quality of the information: scores between 16–27 indicate 'very poor' quality, 28–38 'poor', 39–50 'fair', 51–62 'good', and 63–80 'excellent' (Erkin et al., 2023). Two raters independently evaluated the quality of information about perinatal depression on the selected websites.

2.3 Statistical Analysis

The DISCERN scores for the selected websites were calculated through descriptive analyses and displayed as means and standard deviations. One-way ANOVA was employed to compare the mean total DISCERN scores among the four categories of health information content providers. Spearman's correlation coefficient was used to analyze the correlation between search engine rankings and total DISCERN scores. Statistical analyses were performed using SPSS software, with $P<0.05$ considered significant. To assess coding consistency, the kappa statistic was used to determine interrater agreement. The two raters were trained together prior to coding, and then each encodes independently to compute K-values.

3. Results

3.1 Characteristics of Included Websites

In this study, a total of 55 websites were screened while 91 were excluded. Among the excluded websites, 50 were advertisements, 17 were news, journal articles, or academic research, 11 had restricted access, 8 were duplicates, 4 were non-readable, and 1 was unrelated. In terms of the website attribute classifications for the included websites, all 55 were affiliated with commercial organizations, representing 100% of the sample. Regarding the providers of health information content, 35 were private individuals (63.7%), 7 were commercial organizations (12.7%), 7 were unspecified (12.7%), and 6 were non-profit organizations (10.9%).
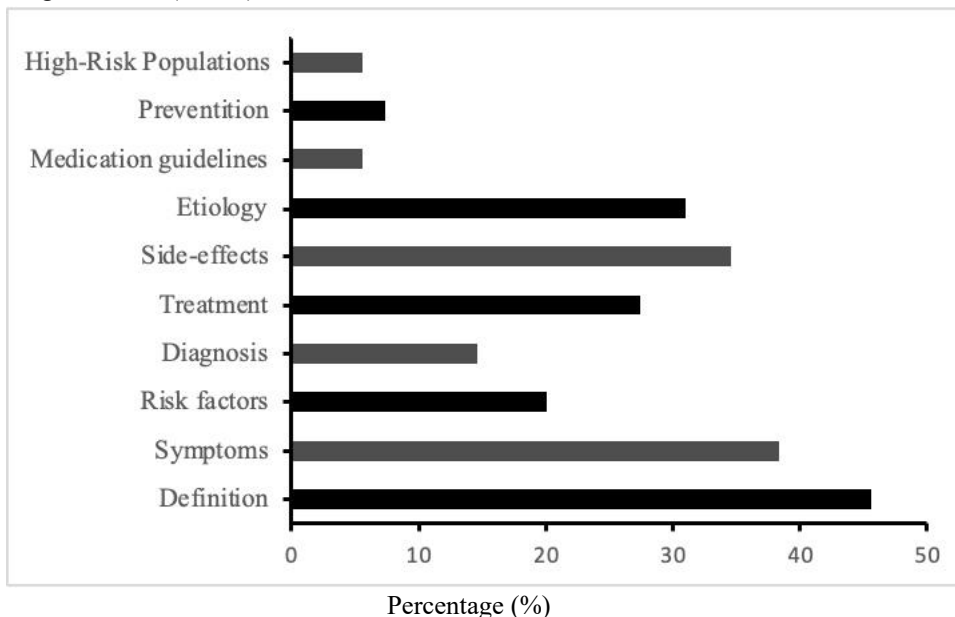

Fig .1. Content of websites included in this study

Figure.1 details the content provided by these websites. As for the content related to perinatal depression, 25 websites (45.5%) addressed its definition, 21 (38.2%) provided information on symptoms, 19 (34.5%) discussed side effects, 17 (30.9%) addressed etiology, and 15 (27.3%) discussed treatment options. The search engine rankings of the selected websites were determined by the order in which it appears in the search results, ranging from 1 to 55.

3.2 Quality Evaluation Using DISCERN

Table1. Mean scores of DISCERN items across all websites

Items of DISCERN	Mean scores (SD）	Interrater agreement (k)
1. Explicit clear aims	3.50 (0.77)	0.56
2. Aims achieved	3.24 (0.78)	0.44
3. Relevance to patients	3.27 (0.76)	0.51
4. Provides Sources of information	1.85 (1.37)	0.72
5. Provides publication date	2.47 (1.07)	0.75
6. Balanced and unbiased	2.95 (0.79)	0.50
7. Provides additional sources of information	1.92 (1.45)	0.70
8. Refers to areas of uncertainty	1.76 (1.25)	0.71
9. Describes how treatment works	1.76 (1.27)	0.56
10. Describes benefits of treatment	1.75 (1.28)	0.55
11. Describes risks of treatment	1.49 (1.03)	0.58
12. Describes what would happen if no treatment were used	1.78 (1.02)	0.59
13. Describes how treatment affects quality of life	1.10 (0.45)	0.83
14. Make clear that there may be other treatment choice	2.19 (1.31)	0.59
15. Supported shared decision-making?	2.23 (1.18)	0.53
16. Overall quality	2.26 (0.99)	0.43
Overall scores	35.55 (13.48)	

Table 1 presents the average DISCERN scores for all 55 websites. These scores were assessed by scoring each of the 16 DISCERN items individually by two raters and then calculating the average score for each item based on the scores of the two evaluators. To gauge interrater agreement, we utilized the kappa (κ) coefficient for each item, adopting a $\kappa > 0.40$ as the threshold for acceptable agreement, in accordance with Kraemer and colleagues (2002). The interrater agreement surpassed this benchmark for each item, which indicates a moderate and acceptable level of reliability for the DISCERN instrument. The average score for the overall quality of information (item 16) was 2.26 ± 0.99, suggesting that the websites generally did not fulfill the criterion for good quality health information on perinatal depression. The mean scores for the 16 items varied, ranging from 1.10 ± 0.45 (item 13) to 3.50 ± 0.77 (item 1). All items related to treatment (items 9-13) were rated low. The overall mean score for the 55 websites was 35.55 ± 13.48, with individual website scores ranging from 20.0 to 69.5.
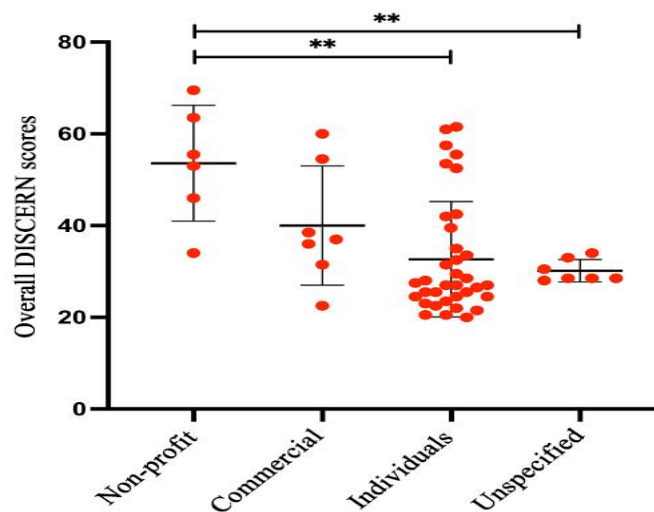

Fig. 2. Overall DISCERN scores according to the providers of health information content

Within the subgroup of website attributes, all 55 websites (100%) were affiliated with commercial organizations. Regarding the four subcategories of information content providers, Fig.2 indicates that content generated by private individuals accounted for 35 cases (63.6%) and had an average DISCERN score of 32.64 ± 12.58. Content from non-profit organizations, totaling 6 instances (10.9%), had the highest mean DISCERN score of 53.58 ± 12.62. Content provided by commercial organizations comprised 7 cases (12.7%), with an average score of 40.00 ± 13.01. Additionally, 7 instances (12.7%) of content were from unspecified sources, scoring an average of 30.14 ± 2.44. The one-way ANOVA revealed a statistically significant difference between the non-profit organizations and both the private individuals (p=0.001) and unspecified sources (p=0.005). However, no significant difference was observed between the non-profit and commercial organizations, nor between the commercial organizations and both individuals and unspecified sources. Likewise, no significant difference was noted between the individuals and unspecified sources. Notably, the scores of non-profit groups were significantly higher than those of both individual (p < 0.05) and unspecified (p < 0.05) groups.

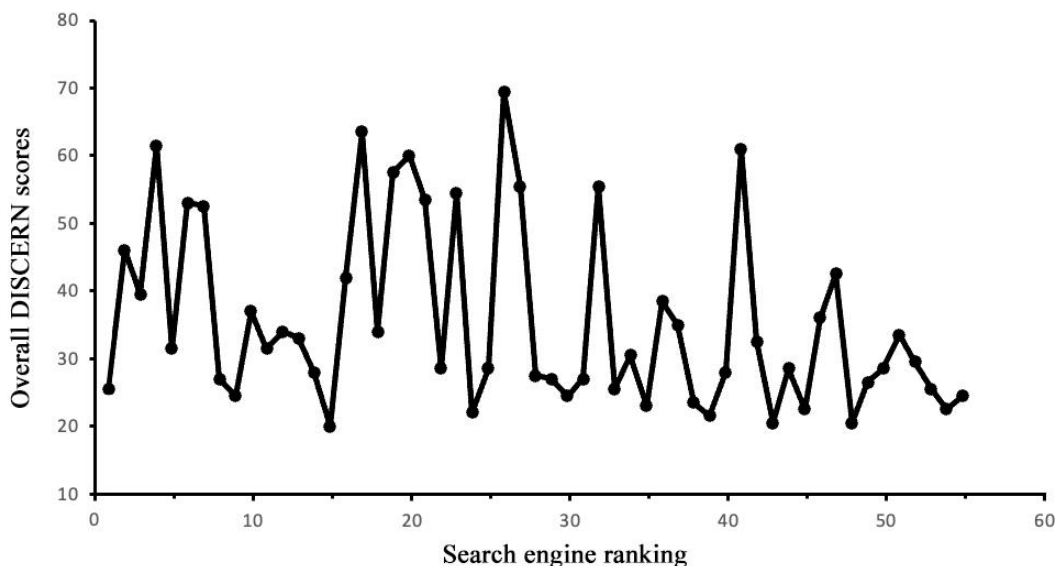*3.3 Correlations between Search Engine Ranking and Website Quality*

Fig. 3. Correlations between Search engine ranking and website quality

Figure.3 depicts the correlations between the search engine ranking positions and the overall DISCERN scores. The result showed that there is a significant negative correlation (r = -.349, p = 0.009) between the two variables. This moderate, negative correlation demonstrates that websites with higher DISCERN scores, which imply better quality health information, are ranked lower in search engine results. The significance of this negative correlation is supported by the p-value of 0.009, affirming its statistical significance (p < 0.05).

4. Discussion

Perinatal depression is a significant public health issue affecting women globally during and after pregnancy. Studies reveal that there is considerable variability in the quality of online information about perinatal depression. Hardman et al. (2022) reported that the quality scores of website information fluctuated from 1.8 to 4.3 out of 5, with numerous websites lacking comprehensive treatment options. Artieta-Pinedo et al. (2018) found that most online information on pregnancy, childbirth, and the postpartum period was either of moderate (39.7%) or poor (36.5%) quality. Similarly, Kirby et al. (2018) observed that average DISCERN scores for websites ranged from 1.6 to 3.9 out of 5, indicating that much of the information did not fully meet or only partially met the criteria for quality information. The prevalence of such low-quality online health information can create confusion and misinformation, presenting obstacles for those seeking reliable guidance. Prior studies have predominantly focused on English and Spanish resources. This study is pioneering in its assessment of Chinese-language websites on perinatal depression, addressing a significant gap in the literature.

In our systematic analysis of Chinese websites concerning perinatal depression using the DISCERN instrument, we found that the average overall score was approximately 36, categorizing this information as "poor" according to the grading scale by Charow et al. (2019). This scale classifies quality as "very poor" (below 27), "poor" (27–38), "fair" (39–50), "good" (51–62), and "excellent" (63 and above). Based on this classification, 16 (29.1%) of the 55 websites in this study would be rated as "very poor," 23 (41.8%) as "poor," 5 (9.1%) as "fair", 9 (16.4%) as "good", and only 2 (3.6%) as "excellent." This distribution demonstrates that the overall quality of online health information on perinatal depression in

Chinese is low, aligning with the findings from similar studies on English and Spanish language websites. Research by Artieta-Pinedo et al. (2018) and Kirby et al. (2018) reported very low overall quality of online information on women's health during pregnancy, with many sites not meeting or only partially meeting the necessary quality standards. Hardman et al. (2022) observed a predominance of low-to-moderate quality content in their assessment of online health information on perinatal depression. While the deficiencies in the quality of information are similar across languages, The overall quality scores of online information about perinatal depression on Chinese websites were lower than those on English and Spanish websites. This study suggests that in the case of perinatal depression, the quality of health information available on Chinese websites is low, and individuals searching through the Baidu search engine may face challenges in finding reliable and comprehensive information.

In our analysis of 55 websites providing information on perinatal depression, we observed that all were commercially affiliated, with no representation from non-commercial entities such as government, non-profit organizations, or public hospitals. Notably, even when health information originated from non-commercial sources, like the Guangzhou Municipal Health Commission or public institutions such as the Women & Children Medical Treatment Centre, it was disseminated through commercial platforms like WeChat's official account platforms, rather than from the non-commercial organizations' own official websites. This finding differs from previous studies examining the quality of health information on the Internet in China for other types of illnesses, as well as studies focused on perinatal mental health information on English-language websites. However, this observation has some similarities with the findings of Niu et al. (2016), who noted that non-commercial websites rarely appeared in the top 20 search results on the Baidu search engine. This study underscores potential disparities in the visibility of health information on the Chinese web, depending on whether it is presented by commercial or non-commercial organizations.

Regarding the authorship of online health information content provided has shown that information generated by non-profit organizations garnered higher DISCERN scores than those provided by private individuals, commercial organizations, or unspecified authorship. This result echoes the outcomes of other studies that agents that create health misinformation are mostly individuals with no official or institutional affiliations(Wang et al., 2019), and that health information authored by non-profit or professional institutions typically possesses greater quality (Charow et al., 2019; Li et al., 2021). Possible reasons for this are that, on the one hand, non-profit organizations, including public hospitals and government agencies, have superior access to accurate, comprehensive, and up-to-date medical information and have demonstrated greater expertise in writing medical information. Secondly, such organizations are generally less susceptible to commercial interests that may compromise the objectivity and integrity of the information provided. Thus, these factors jointly contribute to the high quality of health information produced by non-profit organizations.

In this study, we also found that search engine ranking was significantly negatively correlated with website quality. This is inconsistent with previous studies using Google or Baidu for web-based health information quality assessment, which indicated that there is no correlation between search engine ranking and information quality (Li et al., 2021; Murray et al., 2019). Notably, in the first ten pages of search results obtained during this study, the initial two to three entries on each page were advertisements. For instance, on the first page alone, there were five advertisements among fifteen results, with the top three being advertisements. These commercial advertisements were not only more numerous but also received higher rankings than other health information content. This situation again echoes the "Wei Zexi Incident", where Baidu's search engine was criticized for prioritizing medical information content based on payment rather than the quality of the information (Wang Shichuan, 2016). This study suggests that users of the Baidu search engine might struggle to find high-quality health information promptly, as Baidu does not prioritize the most reliable information on the most accessible pages. Therefore, individuals are tasked with sifting through a considerable volume of information to find quality content.

This study has some limitations. Firstly, it relied solely on Baidu search engines for data collection, which may yield different results compared to other search engines. While Baidu is the largest Chinese-language search engine, representing a substantial portion of the country's online search activity, there's a possibility that it doesn't encompass all the available information on the topic at hand. Future research could benefit from incorporating a broader range of search engines. Secondly, our research used a single keyword, "perinatal depression," which, despite capturing a wide spectrum of related information, means the 55 websites analyzed may not represent the entirety of online resources on the subject. Future studies should consider including additional relevant keywords to capture a more comprehensive scope of perinatal depression-related content. Lastly, the dynamic nature of the Internet, with continuous updates to website content, may affect the durability of our findings, as the data we analyzed can change at any moment.

5. Conclusion

Our analysis indicates that the quality of websites on perinatal depression in Chinese is currently not satisfactory. All the examined websites were affiliated with commercial organizations, while health information content provided by non-profit organizations was found to be of the highest quality. There was also a significant negative correlation between

search engine rankings and the quality of the websites. the fact that the first few search results are typically paid advertisements, it's possible that commercial priorities may overshadow the dissemination of quality health information. This prioritization could potentially mislead those in search of essential health information during the critical perinatal period when precise and reliable guidance is most needed. Hence, it highlights the difficulty users face when seeking trustworthy health information. Considering Baidu's market dominance in China, the establishment of better mechanisms to highlight and give precedence to high-quality health information on the web is urgently required.

Acknowledgments

Authors contributions

Not applicable.

Funding

Competing interests

Not applicable.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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