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Research Article

Quality of Turkish Online Information on Antibiotic Use in Periodontal Treatment: A Web-Based Analysis

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Abstract

Objective: To evaluate the reliability, quality and infodemiological profile of online information on antibiotic use in periodontal disease treatment in Türkiye.

Materials and Methods: Six Turkish search terms related to periodontal antibiotics were queried in Google and Yandex in March 2026. After deduplication and eligibility screening, 116 webpages were analysed. Reliability was assessed using Journal of the American Medical Association (JAMA) benchmarks, information quality using DISCERN and Global Quality Scale (GQS), and clinical alignment using a periodontal antibiotic stewardship checklist based on contemporary periodontal guidance. Readability was estimated with the Atesman index. Group comparisons were performed using Kruskal-Wallis and chi-square tests.

Results: The median DISCERN score was 38.0 (IQR: 31.0-48.0), and 64.7% of webpages were classified as poor or very poor. The median JAMA score was 1.0 (IQR: 1.0-2.0), with attribution present in 19.0% and currency in 28.4%. Professional/university websites had higher DISCERN scores than private clinic websites (52.0 vs 36.0; $p<0.001$) and greater guideline alignment (6.0 vs 3.0; $p<0.001$). Only 21.6% required clinical evaluation before antibiotics, whereas 34.5% implied that antibiotics could independently treat gingival or periodontal inflammation. Antimicrobial resistance was mentioned in 27.6% of webpages. Higher search rank was weakly associated with lower DISCERN scores ($\rho=-0.24$; $p=0.010$).

Conclusion: Turkish online information on periodontal antibiotic use was highly visible but clinically uneven. Most webpages lacked transparent sourcing, risk communication and stewardship-oriented messages. These findings may help Turkish dental regulatory bodies and professional organizations develop standardized, search-visible public guidance on periodontal antibiotic use.

Keywords: Antibiotics; Antimicrobial stewardship; Infodemiology; Periodontitis; Reliability; Türkiye

Introduction

Patients increasingly use search engines to interpret symptoms, assess treatment options and decide whether professional care is necessary. In oral health, this pattern is clinically important because online content may shape expectations before the dental visit and may influence self-medication, delayed referral and antibiotic-seeking behaviour. The terms infodemiology and infoveillance describe methods for studying the distribution and determinants of online health information and health-related search behaviour (1,2).

The quality of health information on the Internet is commonly assessed through transparency, authorship, attribution, currency, readability and completeness. The JAMA benchmarks provide a concise reliability framework, whereas DISCERN evaluates the quality of written information about treatment choices (3,4). Previous periodontal studies have shown that online information about periodontal disease is frequently incomplete, difficult to read and insufficiently aligned with evidence-based care (5-8).

Antibiotic use in periodontal therapy is a particularly sensitive subject. Contemporary treatment guidelines emphasize stepwise periodontal therapy, professional instrumentation, behavioural change, risk-factor control and supportive care; systemic antimicrobials may provide additional clinical benefit in selected cases, but they are not a substitute for diagnosis, debridement and individualized treatment planning (9-13). The clinical message is therefore narrow and nuanced: antibiotics can be useful as adjuncts in defined circumstances, but indiscriminate prescription or self-use is inconsistent with antimicrobial stewardship (14-18).

This issue has practical relevance in Türkiye. A web-based survey of periodontology specialists in Türkiye reported relatively high systemic antibiotic prescribing in periodontal contexts, suggesting a need for clearer professional guidance and public-facing communication (19). However, the content that Turkish-speaking patients encounter when searching for periodontal antibiotics has not been sufficiently characterized. The present study aimed to evaluate the reliability, quality, clinical alignment and infodemiological profile of Turkish online information on antibiotic use in periodontal disease treatment.

Materials and Methods

Study design and ethical considerations

This cross-sectional web-based content analysis evaluated publicly accessible Turkish webpages. The study did not involve human participants, identifiable personal data, patient records or intervention; therefore, formal ethics committee approval was not required. The methodology was designed before data extraction and followed previous approaches used for online periodontal health information assessment (5-8).

Search strategy and webpage selection

Searches were performed in March 2026 using Google and Yandex from a browser with cleared cache, disabled personalization and Türkiye region settings. Six Turkish search terms were used: “periodontal hastalık antibiyotik”, “diş eti hastalığı antibiyotik”, “periodontitis antibiyotik tedavisi”, “diş eti iltihabı antibiyotik”, “diş eti tedavisinde antibiyotik”, and “periodontal tedavide antibiyotik”. The first 50 results for each term and search engine were exported, yielding 600 records. Sponsored results, duplicate URLs, academic databases, inaccessible pages, social media-only posts, video-only pages without text transcript, forums without editorial control, product advertisements without educational content and pages not primarily addressing periodontal or gingival antibiotic use were excluded. After screening, 116 webpages were included.

Variables and scoring instruments

Each webpage was classified by source type: private dental clinic, private hospital, professional/university source, commercial/dental information portal, or news/media website. Reliability was assessed using the four JAMA benchmarks: authorship, attribution, disclosure and currency.³ The DISCERN instrument was used to rate treatment-information quality on a 16-80 scale, with higher scores indicating better quality.⁴ The Global Quality Scale (GQS; 1-5) was used as an overall quality and flow measure in line with previous online health information studies (5,6).

A periodontal antibiotic stewardship checklist was developed from periodontal treatment guidelines and systematic reviews.⁹⁻¹⁸ The checklist included eight binary items: (1) recommendation for dental/periodontal examination before antibiotic use; (2) statement that antibiotics are adjuncts rather than stand-alone periodontal treatment; (3) description of mechanical debridement or cause-related therapy; (4) distinction between gingivitis, periodontitis,

abscess and necrotizing periodontal conditions; (5) warning against self-medication; (6) mention of adverse effects/allergy/drug interactions; (7) mention of antimicrobial resistance; and (8) advice to seek urgent professional care for swelling, fever, spreading infection or systemic symptoms. The total clinical alignment score ranged from 0 to 8.

Readability and infodemiological variables

Readability was calculated using the Atesman index, a Turkish adaptation based on sentence and word length, where higher values indicate easier readability (27). The Bezirci-Yilmaz formula was additionally recorded as a supplementary readability metric for Turkish texts (28). Infodemiological variables included search engine, rank position, snippet framing, update date, domain type, presence of named author, presence of references, and whether the webpage explicitly mentioned antibiotic resistance, adverse effects, prescription requirement or non-antibiotic periodontal therapy.

Reliability of scoring and statistical analysis

Two calibrated reviewers independently scored 25 randomly selected webpages. Inter-rater agreement was substantial for JAMA benchmarks (Cohen's kappa=0.82) and strong for DISCERN total score (intraclass correlation coefficient=0.89). Disagreements were resolved by consensus, after which one reviewer completed scoring and the second reviewer audited 20% of entries. Statistical analyses were performed using IBM SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA). Normality was assessed using Shapiro-Wilk tests and visual inspection. Continuous variables are presented as median and interquartile range (IQR) unless otherwise stated. Kruskal-Wallis tests with Dunn-Bonferroni post hoc comparisons were used for source-group analyses. Categorical variables were compared using chi-square or Fisher's exact tests. Spearman correlation was used to evaluate associations between search rank and quality metrics. A p value <0.05 was considered statistically significant.

Results

Webpage selection and source profile

Of 600 initial search records, 312 remained after duplicate removal. Screening excluded 196 records, most commonly because the page was unrelated to periodontal antibiotic use, consisted only of a commercial product listing, or duplicated information from another page on the same domain. The final sample comprised 116 webpages. Private dental clinics represented the largest group (52.6%), followed by commercial/dental information portals

(16.4%), news/media websites (12.1%), private hospitals (10.3%) and professional/university sources (8.6%). Authorship was reported in 37.1% of webpages, but only 19.0% cited scientific or professional sources (Table 1).

Table 1. Source characteristics and transparency indicators of the included webpages (n=116).

Variable	Total n (%)	Private clinic n=61	Private hospital n=12	Professional/university n=10	Commercial portal n=19	News/media n=14	p value
Authorship stated	43 (37.1)	18 (29.5)	5 (41.7)	9 (90.0)	7 (36.8)	4 (28.6)	<0.001
Scientific/professional references cited	22 (19.0)	6 (9.8)	3 (25.0)	8 (80.0)	4 (21.1)	1 (7.1)	<0.001
Date of publication/update stated	33 (28.4)	12 (19.7)	4 (33.3)	8 (80.0)	5 (26.3)	4 (28.6)	0.002
Advertising or service-promotion language present	68 (58.6)	49 (80.3)	7 (58.3)	1 (10.0)	8 (42.1)	3 (21.4)	<0.001
Prescription requirement mentioned	54 (46.6)	22 (36.1)	7 (58.3)	8 (80.0)	9 (47.4)	8 (57.1)	0.042
Antimicrobial resistance mentioned	32 (27.6)	11 (18.0)	5 (41.7)	7 (70.0)	5 (26.3)	4 (28.6)	0.004

Values are number (percentage). Group comparisons were performed using chi-square or Fisher's exact tests.

Reliability, quality and readability scores

The overall median JAMA score was 1.0 (IQR: 1.0-2.0), indicating limited transparency. The median DISCERN score was 38.0 (IQR: 31.0-48.0), and 64.7% of webpages were classified as poor or very poor. Professional/university webpages had the highest median DISCERN score (52.0; IQR: 45.0-60.0), whereas private clinic pages had lower scores (36.0; IQR: 29.0-45.0; $p < 0.001$). The median Atesman readability score was 54.5 (IQR: 45.3-63.7), corresponding to moderately difficult Turkish text (Table 2).

Table 2. Reliability, quality, clinical alignment and readability scores by source type.

Score	Total median (IQR)	Private clinic	Private hospital	Professional/university	Commercial portal	News/media	p value
JAMA score (0-4)	1.0 (1.0-2.0)	1.0 (0.0-1.0)	2.0 (1.0-2.0)	3.0 (2.0-3.0)	1.0 (1.0-2.0)	1.0 (1.0-2.0)	<0.001
DISCERN total (16-80)	38.0 (31.0-48.0)	36.0 (29.0-45.0)	43.0 (35.0-51.5)	52.0 (45.0-60.0)	39.0 (32.0-48.0)	35.5 (29.0-43.0)	<0.001
GQS (1-5)	2.0 (2.0-3.0)	2.0 (1.0-3.0)	3.0 (2.0-3.0)	4.0 (3.0-4.0)	2.0 (2.0-3.0)	2.0 (1.0-3.0)	<0.001
Clinical alignment (0-8)	3.0 (1.0-5.0)	3.0 (1.0-4.0)	4.0 (2.0-5.0)	6.0 (5.0-7.0)	3.0 (2.0-5.0)	2.0 (1.0-4.0)	<0.001
Ateşman readability (0-100)	54.5 (45.3-63.7)	56.1 (47.0-65.8)	51.2 (44.5-59.4)	48.6 (41.8-57.0)	55.9 (46.2-64.1)	58.3 (49.7-66.4)	0.214
Bezirci-Yılmaz estimated grade	12.4 (10.8-14.1)	12.0 (10.4-13.8)	12.8 (11.1-14.3)	13.7 (12.2-15.5)	12.5 (10.9-14.2)	11.9 (10.6-13.2)	0.187

IQR: interquartile range; JAMA: Journal of the American Medical Association benchmarks; GQS: Global Quality Scale. Kruskal-Wallis tests were used for all comparisons.

Antibiotic-specific content and stewardship indicators

Only 25 webpages (21.6%) clearly stated that antibiotic use should follow clinical examination and professional diagnosis. Forty webpages (34.5%) contained wording that could be interpreted as antibiotics being sufficient to treat gingival or periodontal inflammation without debridement or periodontal therapy. Information on adverse effects was absent in 57 webpages (49.1%), and antimicrobial resistance was absent in 84 webpages (72.4%). Red-flag symptoms requiring urgent professional care were mentioned in 39 webpages (33.6%) (Table 3).

Table 3. Periodontal antibiotic stewardship checklist findings.

Checklist item	Present n (%)	Absent n (%)	Comment on clinical relevance
Professional examination before antibiotic use	25 (21.6)	91 (78.4)	Central for preventing self-medication and unnecessary antibiotic exposure.
Antibiotics described as adjuncts, not stand-alone treatment	44 (37.9)	72 (62.1)	Consistent with periodontal guidelines and systematic reviews.
Mechanical debridement/cause-related therapy described	52 (44.8)	64 (55.2)	Frames periodontal therapy as biofilm- and risk-control based.
Distinction between gingivitis, periodontitis, abscess and necrotizing disease	31 (26.7)	85 (73.3)	Important because indications for systemic antibiotics differ by condition.
Warning against self-medication	47 (40.5)	69 (59.5)	Necessary for antimicrobial stewardship in public-facing content.
Adverse effects, allergy or drug interactions mentioned	59 (50.9)	57 (49.1)	Supports balanced treatment-risk communication.
Antimicrobial resistance mentioned	32 (27.6)	84 (72.4)	Major omission in webpages discussing antibiotics.

Checklist item	Present n (%)	Absent n (%)	Comment on clinical relevance
Urgent-care red flags described	39 (33.6)	77 (66.4)	Relevant for swelling, fever, spreading infection and systemic symptoms.

The stewardship checklist score was calculated by assigning 1 point for each present item, for a maximum of 8 points.

Infodemiological profile

Search visibility did not consistently correspond to better quality. The first page of search results contained a higher proportion of private clinic webpages than later results (61.2% vs 47.8%; $p=0.041$). Search rank showed a weak negative correlation with DISCERN score ($\rho=-0.24$; $p=0.010$) and clinical alignment score ($\rho=-0.22$; $p=0.017$), indicating that more visible results tended to have slightly lower quality. Webpages containing promotional language had lower median DISCERN scores than non-promotional pages (34.0 vs 45.0; $p<0.001$). Snippets frequently emphasized rapid relief, swelling, pain or “antibiotic treatment”, whereas fewer snippets mentioned examination, debridement, prescription or resistance (Table 4).

Table 4. Infodemiological characteristics according to search visibility and message framing.

Variable	Overall n (%) or median (IQR)	High visibility: first 10 results per query	Lower visibility: remaining eligible results	p value
Private clinic source	61 (52.6)	41 (61.2)	20 (40.8)	0.041
Professional/university source	10 (8.6)	3 (4.5)	7 (14.3)	0.087
Promotional language in title/snippet	68 (58.6)	47 (70.1)	21 (42.9)	0.004
Snippet mentions “antibiotic treatment” as main phrase	73 (62.9)	48 (71.6)	25 (51.0)	0.026

Variable	Overall n (%) or median (IQR)	High visibility: first 10 results per query	Lower visibility: remaining eligible results	p value
Snippet mentions prescription or dentist control	28 (24.1)	12 (17.9)	16 (32.7)	0.068
Median DISCERN score	38.0 (31.0-48.0)	35.0 (29.0-44.0)	43.0 (34.0-52.0)	0.006
Median clinical alignment score	3.0 (1.0-5.0)	2.0 (1.0-4.0)	4.0 (2.0-5.0)	0.011

High visibility was defined as inclusion among the first 10 organic search results for at least one search term. Continuous variables were compared with Mann-Whitney U tests and categorical variables with chi-square tests.

Discussion

This study found that Turkish online information on antibiotic use in periodontal disease treatment is widely accessible but frequently incomplete, weakly referenced and insufficiently aligned with antimicrobial stewardship. The principal finding was not simply low quality, but a specific clinical imbalance: many webpages mentioned antibiotics in relation to pain, swelling or “gum inflammation” without clearly stating that periodontal therapy requires professional diagnosis, debridement and risk-factor control. This pattern may contribute to an expectation that antibiotics are a primary periodontal treatment rather than an adjunct used in selected circumstances.

The low JAMA and DISCERN scores are consistent with earlier periodontal web-quality studies. Bizzi et al. reported shortcomings in periodontal websites, Kanmaz and Buduneli found that information quality for periodontal disease patients was insufficient, and Daltaban and Üstün documented important deficits in Turkish periodontal webpages (5-7). The present study extends this literature by focusing on antibiotic-related periodontal content, which carries additional public-health implications because misleading information may encourage self-medication or pressure for prescriptions.

Professional and university webpages performed better than private clinic webpages across reliability, DISCERN and clinical alignment metrics. This finding is expected because

institutional sources are more likely to cite guidelines, avoid promotional language and provide a balanced description of benefits and harms. However, professional/university webpages accounted for less than one-tenth of the accessible sample, and they were underrepresented among highly visible search results. This mismatch between quality and visibility is a key infodemiological issue: the webpages most likely to be encountered by patients are not necessarily the most reliable.

The most important content gap involved antimicrobial stewardship. Only 27.6% of webpages mentioned antimicrobial resistance, despite its central place in global health policy and dental prescribing discussions (24-26). Nearly two-thirds failed to state that antibiotics are adjuncts rather than stand-alone periodontal treatment. This omission conflicts with contemporary periodontal guidance, which emphasizes cause-related periodontal therapy and restricts systemic antimicrobials to selected clinical indication (9-13). The risk is not only inaccurate patient understanding; it is also the normalization of antibiotic use for symptoms that may require mechanical treatment, drainage, periodontal evaluation or emergency assessment rather than empirical medication.

The findings also align with survey evidence from Türkiye. Yıldız et al. reported that 55.6% of periodontists prescribed antibiotics as an adjunct to non-surgical periodontal treatment and 77.8% prescribed them for surgical periodontal therapy in their sample (19). Public-facing webpages should therefore be especially careful not to simplify clinical decision-making into a general message that periodontal symptoms require antibiotics. Rather, they should explain that antibiotic selection, dose and duration depend on diagnosis, systemic condition, allergy status, drug interactions and the presence of acute infection or systemic involvement.

Readability deserves attention. The median Atesman score indicated moderately difficult Turkish text, and the Bezirci-Yılmaz metric suggested a high school to university reading level. This is problematic because information on antibiotics must be both accurate and understandable. Overly technical text may lead readers to focus on drug names while missing qualifications, warnings and indications. Conversely, oversimplified promotional text may be easy to read but clinically unsafe. The target standard should be plain Turkish that preserves

key clinical boundaries: no self-medication, no antibiotic use without dental examination, antibiotics are adjuncts when indicated, and periodontal disease requires professional biofilm control.

The study has limitations. Search results are dynamic and may vary by date, location, device and personalization settings. Although browser personalization was minimized, search engine algorithms cannot be fully controlled. The scoring instruments include subjective elements, although reviewer calibration showed high agreement. Video-only content, social media posts and patient forums were excluded; these sources may be important in real-world information exposure. Finally, the clinical alignment checklist was developed for this study from contemporary periodontal and antimicrobial evidence. It is transparent and clinically grounded, but it is not a previously validated scale. Future studies should undertake formal psychometric validation of this checklist, including assessments of construct validity, internal consistency and reproducibility in independent webpage samples.

The findings suggest several practical steps. Dental faculties, professional societies and public-health institutions in Türkiye should publish patient-facing pages on periodontal antibiotics that are search-optimized, regularly updated and written in accessible Turkish. Private clinics should add authorship, update dates, scientific references and stewardship warnings to their patient education pages. Search-visible webpages should avoid listing antibiotic regimens or implying that antibiotics can replace periodontal treatment. A concise public message would be clinically preferable: periodontal antibiotics require dentist or periodontist assessment and are used only when indicated as part of comprehensive care.

Conclusion

Turkish online information on antibiotic use in periodontal disease treatment showed low-to-moderate quality, limited transparency and inconsistent clinical alignment. Professional/university sources were more reliable, but less visible than private clinic webpages. Most webpages did not adequately communicate antimicrobial resistance, prescription requirements, adverse effects or the adjunctive role of antibiotics. Improving the search visibility and readability of evidence-based Turkish content should be considered a priority for periodontal patient education and antimicrobial stewardship.

Declarations

Ethics Committee Approval

Not required because the study evaluated publicly accessible webpages and did not involve human participants, identifiable personal data, patient records or biological material.

Informed Consent

Not applicable.

Conflict of Interest

The authors declare no conflict of interest.

Financial Disclosure

No financial support was received for this study.

Author Contributions

Concept: [M.M.T.]; Design: [O.K.]; Data collection: [M.M.T., O.K.]; Analysis: [E.S.T.]; Literature search: [M.M.T.]; Writing: [M.M.T., O.K., E.S.T.]; Critical revision: [E.S.T.].

Data Availability Statement

All data generated and/or analysed during this study are included in this published article and its supplementary information file (Supplementary File 1).

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