

ASC
**Acta Stomatologica
Cappadocia**



Volume 6, Issue 2
August 2026



ISSN: 2792-047X

<https://asc.kapadokya.edu.tr>

Acta Stomatologica Cappadocia (ASC) 2026, vol. 6, no. 2

Owner

Funda Firuz Aktan

Editor-in-Chief

Prof. Hasan Gökhan Açıkgöz (Cappadocia University, Türkiye)

Associate Editors

Prof. Aydan Açıkgöz (Cappadocia University, Türkiye)

Asst. Prof. Tayfun Ceylan (Cappadocia University, Türkiye)

Section Editor

Prof. Ayfer Kaynar (Yeni Yüzyıl University, Türkiye)

Prof. Gonca Keleş (Okan University, Türkiye)

Prof. Nursel Arıcı (Ondokuz Mayıs University, Türkiye)

Adress: Cappadocia University, Urgup Campus, Faculty of Dentistry
Urgup / Nevşehir

Phone: +90 (384) 353 5009 Fax: +90 (384) 353 5125

Prof. Selma Türkan Elekdag (Ondokuz Mayıs University, Türkiye)

Prof. Tuğrul Kırtıloğlu (Ondokuz Mayıs University, Türkiye)

Assoc. Prof. Sercan Küçük Kurt (İstanbul Aydın University, Türkiye)

Editorial/Advisory Board

Prof. Aysun Avşar (Ondokuz Mayıs University, Türkiye)

Prof. Behçet Erol (İstanbul Aydın University, Türkiye)

Prof. Burcu Çetinkaya (Ondokuz Mayıs University, Türkiye)

Prof. Bülent Kurtiş (Gazi University, Türkiye)

Prof. Dilara Arslan (İstanbul Aydın University, Türkiye)

Prof. Duygu Saraç (Ondokuz Mayıs University, Türkiye)

Prof. Ebru Hazer Bodrumlu (Bülent Ecevit University, Türkiye)

Prof. Korkud Demirel (İstanbul Aydın University, Türkiye)

Prof. Murat Canger (Erciyes University, Türkiye)

Prof. Oğuz Yoldaş (Çukurova University, Türkiye)

Prof. Osman Gökay (Ankara University, Türkiye)

Prof. Pınar Sümer (Ondokuz Mayıs University, Türkiye)

Prof. Sadullah Üçtaşlı (Ankara University, Türkiye)

Prof. Şeyda Hepgüner Siso (İstanbul Aydın University, Türkiye)

Prof. Taşkın Gürbüz (Galata University, Türkiye)

Prof. Tosun Tosun (Atlas University, Türkiye)

Asst. Prof. Ebru Afşar (Cappadocia University, Türkiye)

Asst. Prof. Marilia Daniela Busnardo Canadas (University Of Turku, Finland)

Adress: Cappadocia University, Urgup Campus, Faculty of Dentistry
Urgup / Nevşehir

Phone: +90 (384) 353 5009 Fax: +90 (384) 353 5125

Language Editor

Lecturer Büşra Uyanık (Cappadocia University, Türkiye)

Statistics Editor

Asst. Prof. Selda Öztürk (Cappadocia University, Türkiye)

Adress: Cappadocia University, Urgup Campus, Faculty of Dentistry
Urgup / Nevsehir

Phone: +90 (384) 353 5009 Fax: +90 (384) 353 5125



Table of Contents

Research Articles

The Examination of Professionalism Attitudes Among Dental Students According to Class Level: A Cross-Sectional Study Using the Professionalism Assessment Scale

Ebru Yurdakurban, Ali Batuhan Bayırlı 1-14

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

Mehmet Murat Taşkan, Özkan Karataş, Elif Sırma Taşkan..... 15-29

Adult Patients' Perceptions and Preferences Toward Accelerated Orthodontic Treatment Perceptions of Accelerated Orthodontic Treatment: Perceptions of Accelerated Orthodontic Treatment

Hanan Miftah Ashour, Göksu Trakyalı..... 30-43

Association Between Periodontal Status and ABO and Rh Blood Group Phenotypes: A Cross-Sectional Observational Study

Melis Ziyaettin, Ayşe Ege Selman, Ülkü Tuğba Per, Burcu Karaduman..... 44-60



Volume 6 / Issue 2 / August 2026

Research Article

The Examination of Professionalism Attitudes Among Dental Students According to Class Level: A Cross-Sectional Study Using the Professionalism Assessment Scale

Ebru Yurdakurban¹, Ali Batuhan Bayırlı^{2*}

¹Muğla Sıtkı Koçman University, Faculty of Dentistry, Department of Orthodontics, Muğla, Turkey.

²Muğla Sıtkı Koçman University, Faculty of Dentistry, Department of Periodontology, Muğla, Turkey.

*Corresponding author: batuhanbayirli@mu.edu.tr

Yurdakurban, Ebru., Bayırlı, Ali Batuhan. "The Examination of Professionalism Attitudes Among Dental Students According to Class Level: A Cross-Sectional Study Using the Professionalism Assessment Scale". *Acta Stomatologica Cappadocia*. 6;2 (August 2026): 1-14.

DOI: <https://doi.org/10.54995/ASC.6.2.1>

Received: 27.02.2026; Accepted: 04.06.2026

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



The Examination of Professionalism Attitudes Among Dental Students According to Class Level: A Cross-Sectional Study Using the Professionalism Assessment Scale

Ebru Yurdakurban, Ali Batuhan Bayırlı

Abstract

The aim of this study was to evaluate professionalism attitudes among dental students across different year levels and to investigate the effect of clinical experience on the subscales of the Professionalism Assessment Scale. This cross-sectional study included 412 students enrolled in the Faculty of Dentistry at Muğla Sıtkı Koçman University. Data were collected using the Turkish version of the Professionalism Assessment Scale (PAS-TR), the validity and reliability of which have been previously established. The scale comprises three subscales: Professional Relationship and Development, Empathy–Humanism, and Responsibility. Internal consistency was assessed using Cronbach’s alpha coefficient. Intergroup comparisons were performed using the Kruskal–Wallis test, followed by the Mann–Whitney U test for post hoc pairwise analyses when statistically significant differences were identified. Overall professionalism attitude scores did not differ significantly among year levels ($p > 0.05$). However, students in the clinical years (fourth and fifth years) demonstrated significantly higher scores in the Professional Relationship and Development ($p = 0.023$) and Responsibility ($p = 0.030$) subscales compared with preclinical students. No statistically significant differences were observed for the Empathy–Humanism subscale. The overall internal consistency of the scale was high (Cronbach’s $\alpha = 0.88$).

Although overall professionalism attitudes remained relatively stable across year levels, improvements were observed in subdomains closely related to clinical experience.

Keywords: Clinical education, dental students, PAS-TR, professionalism.

Introduction

Professionalism is a multidimensional competency that encompasses honesty, responsibility, and respectful communication in clinical practice, while prioritizing patient welfare and upholding the principles of autonomy. The Physician Charter defines these principles as the foundation of the professional social contract in contemporary medical and dental education (1). Professional competence extends beyond technical knowledge and skills; the consistent and measured integration of communication, clinical reasoning, emotional regulation, and reflective self-assessment also constitutes an essential component of professional capability (2).

In competency-based medical and dental education, professionalism is systematically structured, and its assessment is recommended through observable behaviors demonstrated at progressively increasing levels of complexity (3). In dentistry, professionalism represents a core component of both undergraduate and postgraduate curricula, and its continuous monitoring through reliable assessment tools is critical for educational quality and professional regulation (4). Evidence increasingly supports the role of clinical training experiences in fostering the development of professionalism, highlighting the importance of intentionally integrating this dimension into curricular design (5).

Professionalism is not merely an educational requirement but is directly linked to tangible outcomes related to patient safety and professional standards. Studies have shown that unprofessional behaviors observed during medical school are significantly associated with disciplinary actions in later professional life (6). Similarly, unprofessional conduct within healthcare teams can introduce risks and operational challenges in clinical service delivery (7). Scale-based assessment methods provide a practical and reproducible means of evaluating professionalism. For this purpose, the Professionalism Assessment Scale (PAS), developed by Klemenc-Ketiš and Vrečko, is a 22-item, five-point Likert-type instrument comprising three factors: Empathy–Humanism, Professional Relationship and Development, and Responsibility. Its validity and reliability have been confirmed in the original population (8). The Turkish adaptation of PAS demonstrated a stable three-factor structure with high internal consistency and test–retest reliability among medical students (9). Similar psychometric properties were reported in dental students, indicating that professionalism attitudes in dentistry can be reliably assessed using PAS (10).

In dental education, the transition to clinical training typically begins in the third year, and the increased patient contact and responsibilities in the fourth and fifth years may reinforce components of professionalism such as professional identity formation, communication, and ethical decision-making. Given the distinct learning environments of preclinical (years 1–3) and clinical (years 4–5) phases, a systematic variation in professionalism attitudes across year levels can be anticipated. This study aimed to compare professionalism attitudes among dental students from the first to fifth year using the PAS-TR and to examine whether these attitudes differed according to clinical experience. In this context, the null hypothesis of the study is that professionalism attitudes and related subscale scores among dental students do not differ significantly according to year level or clinical experience.

Materials and Methods

Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Cappadocia University on 10 September 2025 (Decision No: 25.09). All volunteer students enrolled in the 1st, 2nd, 3rd, 4th, and 5th years of the Faculty of Dentistry at Muğla Sıtkı Koçman University were included in the study. The inclusion criteria consisted of being a student at Muğla Sıtkı Koçman University Faculty of Dentistry and providing informed consent to participate, while the exclusion criterion was unwillingness to take part in the study.

The PAS is a 22-item, five-point Likert-type self-assessment instrument. Response options include “1 = Strongly disagree,” “2 = Disagree,” “3 = Neutral,” “4 = Agree,” and “5 = Strongly agree” (Table 1). The professionalism subscales were evaluated as follows: Empathy–Humanism with items 1, 2, 3, 4, 6, 8, 10, 16, 19, and 20; Professional Relationship and Development with items 5, 9, 11, 12, 13, 14, 15, and 22; and Responsibility with items 7, 17, 18, and 21. Higher scores indicate more positive professionalism attitudes. Additional variables collected through a short demographic form included age, gender, year of study, intention to pursue specialization, post-graduation plans, and weekly hours of clinical observation. The PAS and demographic form were completed by 427 volunteers, and no identifying personal information was collected. For subgroup analysis, third-year students were compared with fourth- and fifth-year students because the third year represents the transitional stage before intensive clinical training, whereas the fourth and fifth years involve direct patient contact and increased

clinical responsibility. This comparison was performed to evaluate the potential association between clinical exposure and professionalism attitudes.

Table 1: Professionalism Assessment Scale-PAS

Items	1	2	3	4	5
1. When managing patients, the physician should put aside his/hers prejudices.	☐	☐	☐	☐	☐
2. The current bad mood of the physician should not affect the management of patients.	☐	☐	☐	☐	☐
3. The physician should have a respectful relationship with the patients.	☐	☐	☐	☐	☐
4. Physicians should have a respectful relationships with their coworkers.	☐	☐	☐	☐	☐
5. The physician should constantly engage in continuous professional education.	☐	☐	☐	☐	☐
6. The physician should do his/her best to help the patient in every consultation.	☐	☐	☐	☐	☐
7. The physician should not judge the patient by appearance.	☐	☐	☐	☐	☐
8. The physician should adapt to the level of the patient's understanding.	☐	☐	☐	☐	☐
9. The physician should set a clear limit to which the patient can claim his/her requests.	☐	☐	☐	☐	☐
10. The physician should be a good role model for students.	☐	☐	☐	☐	☐
11. The physician should be able to set a clear line between private and professional life.	☐	☐	☐	☐	☐
12. The physician should aspire to a professional relationship in his/her team.	☐	☐	☐	☐	☐
13. A lot of clinical knowledge is not sufficient to be a good physician.	☐	☐	☐	☐	☐
14. Physician-patient communication is the basis of patient management.	☐	☐	☐	☐	☐
15. The physician should also try to understand the patient's nonmedical problems (i.e., poor financial status, family relationship problems) and include them in consultation.	☐	☐	☐	☐	☐
16. Each patient deserves individual management.	☐	☐	☐	☐	☐
17. It is the physician's duty to present his/hers professional opinion to the patient in such a way that the patient can understand and accept it.	☐	☐	☐	☐	☐
18. The physician can not always know what is best for each patient.	☐	☐	☐	☐	☐
19. The physician must protect the confidentiality of the patient.	☐	☐	☐	☐	☐
20. The physician should show interest in the patient.	☐	☐	☐	☐	☐
21. The physician should tell the patient frankly if there is something he/she does not know.	☐	☐	☐	☐	☐
22. It is acceptable that the physician can make mistakes.	☐	☐	☐	☐	☐

Statistical Analysis

Sample size estimation was performed using the G*Power 3.1.2 software (University of Kiel, Germany) based on a one-way analysis of variance framework for the year-level variable. The analysis targeted 80% statistical power and a medium effect size (Cohen's $f = 0.25$), with a type I error probability of 0.05. Accordingly, the minimum required sample size was calculated as $n = 200$.

Demographic characteristics of participants were summarized using Frequency (n) and Percentage (%). For the items and subscales of the scale, Mean (M) and Standard Deviation (SD) values were calculated. Reliability of the scales was assessed using Cronbach's alpha coefficient. Normality of the data was examined with the Kolmogorov–Smirnov test. Since the data did not follow a normal distribution, nonparametric statistical methods were applied. Changes in professionalism attitudes across year levels were evaluated using the Kruskal–Wallis test, while subgroup comparisons between clinical (4th and 5th year) and nonclinical (3rd year) students were conducted using the Mann–Whitney U test. A p -value < 0.05 was considered statistically significant.

Results

Following missing data and outlier analyses, 412 of the 427 completed questionnaires were deemed suitable for evaluation. The demographic characteristics of the participants are summarized in Table 2. The study sample consisted of 412 students, of whom 225 (54.6%) were female and 187 (45.4%) were male. The majority of the students (68.7%) were between 19 and 22 years of age. Additionally, 29.4% of the participants were fourth-year students. More than half of the students (55.8%) reported 10 hours or fewer of weekly clinical observation. Most students (86.2%) indicated having post-graduation plans or an intention to pursue specialization. Over half of the participants (56.3%) stated that they had not previously received professionalism training (Table 3).

Reliability coefficients for the scales and the overall questionnaire are presented in Table 4. Among the subscales, Empathy–Humanism demonstrated the highest internal consistency ($\alpha = 0.84$). The overall reliability coefficient of the questionnaire was 0.88.

Table 2: Demographic Characteristics of the Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	225	54.6
	Male	187	45.4
Age	18 years and below	30	7.28
	19-22 years	283	68.7
	23 years and above	99	24.02
Weekly Clinical Observation Hours	10 hours or less	230	55.8
	11-20 hours	117	28.4
	21 hours and above	65	15.8
Year of Study	1st year	71	17.2
	2nd year	76	18.4
	3rd year	75	18.2
	4th year	121	29.4
	5th year	69	16.7
Total		412	100

Table 3: Distribution of Participants' Post-Graduation Plans and Prior Professionalism Training

Variable	Category	Frequency (n)	Percentage (%)
Do you have a post-graduation plan or interest in specialization?	No	15	3.6
	Undecided	42	10.2
	Yes	355	86.2
Have you previously received professionalism training?	No	232	56.3
	Yes	180	43.7

Table 4: Reliability Analysis Results for the Scales

Scales	Cronbach's Alpha
Empathy and Humanism	0.84
Professional Relationship and Development	0.68
Responsibility	0.48
Overall	0.88

Descriptive statistics for the items included in the professionalism scale and its subscales are shown in Table 6. The item with the highest mean score was “The dentist should maintain a respectful relationship with patients” (mean = 4.83), while the item with the lowest mean score was “The dentist does not always know what is best for the patient” (mean = 3.57). The mean total professionalism score was 97.9, with a standard deviation of 9.14 (Figure 1).

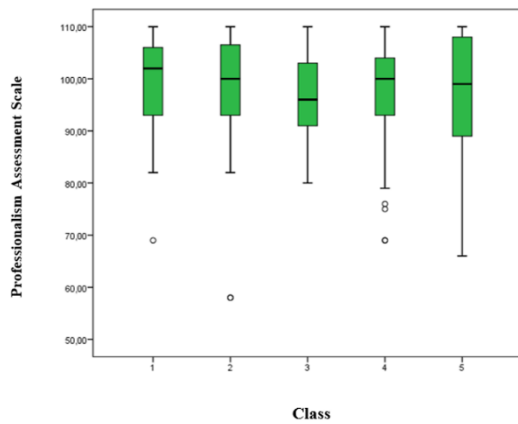
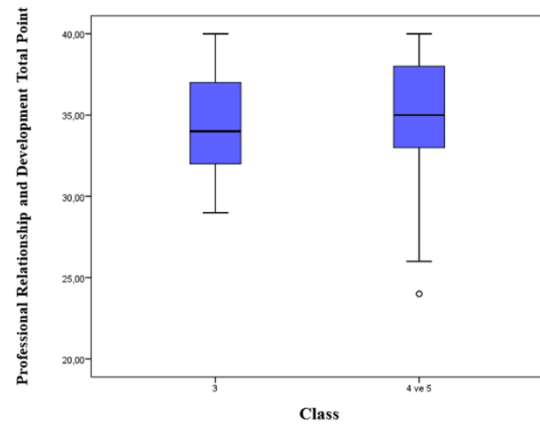
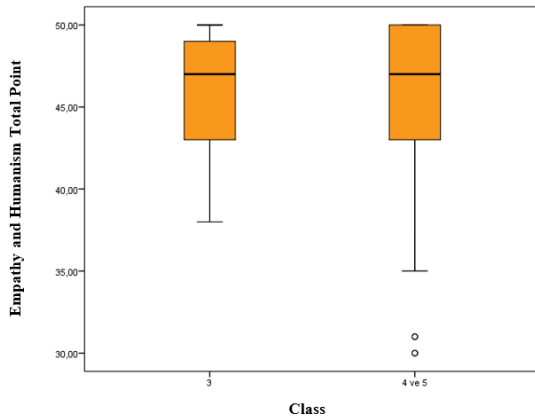
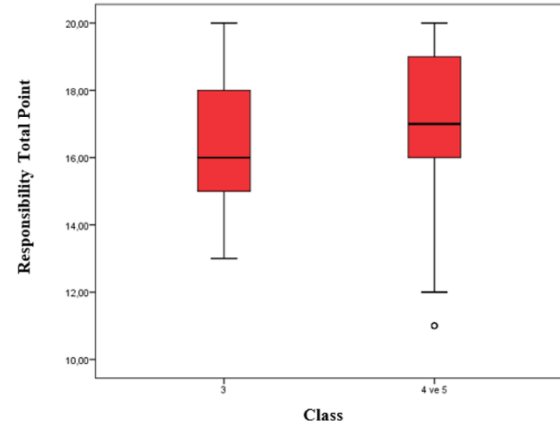
**Figure 1.** The Box Plot of Professionalism Assessment Scale**Figure 2.** The Box Plot of the Professional Relationship and Development**Figure 3.** The Box Plot of the Empathy and Humanism**Figure 4.** The Box Plot of the Responsibility

Table 5: Descriptive Statistics of Professionalism Assessment Scale and Subscales

Subscales	Mean	SD
<i>Empathy and Humanism</i>	45.88	4.44
When managing patients, the physician should put aside his/hers prejudices.	4.51	0.73
The current bad mood of the physician should not affect the management of patients.	4.61	0.74
The physician should have a respectful relationship with the patients.	4.83	0.47
Physicians should have a respectful relationship with their coworkers.	4.70	0.61
The physician should do his/her best to help the patient in every consultation.	4.70	0.55
The physician should adapt to the level of the patient's understanding.	4.45	0.76
The physician should be a good role model for students.	4.65	0.69
Each patient deserves individual management.	4.42	0.81
The physician must protect the confidentiality of the patient.	4.57	0.67
The physician should show interest in the patient.	4.44	0.75
<i>Professional Relationship and Development</i>	34.80	3.77
The physician should constantly engage in continuous professional education.	4.24	0.78
The physician should set a clear limit to which the patient can claim his/her requests.	4.39	0.76
The physician should be able to set a clear line between private and professional life.	4.52	0.68
The physician should aspire to a professional relationship in his/her team.	4.61	0.63
A lot of clinical knowledge is not sufficient to be a good physician.	4.03	1.19
Physician–patient communication is the basis of patient management.	4.57	0.67
The physician should also try to understand the patient's nonmedical problems (i.e., poor financial status, family relationship problems) and include them in consultation.	3.96	1.09
It is acceptable that the physician can make mistakes.	4.48	0.74
<i>Responsibility</i>	17.20	2.07
The physician should not judge the patient by appearance.	4.53	0.83
It is the physician's duty to present his/her professional opinion to the patient in such a way that the patient can understand and accept it.	4.56	0.66
The physician cannot always know what is best for each patient.	3.57	1.08
The physician should tell the patient frankly if there is something he/she does not know.	4.55	0.67
Overall	97.90	9.14

*SD: Standard Deviation

Table 6: Kruskal–Wallis Test Results for Total Professionalism Assessment Scale

Variable	Category	n	Mean Rank	Mean	SD	Kruskal-Wallis Test		Effect size
						Test value	p	
Class Year	1st year	71	227.01	99.39	8.71	6.763	0.149	0.01
	2nd year	76	214.88	98.15	10.16			
	3rd year	75	179.74	96.53	7.55			
	4th year	121	201.54	97.68	8.53			
	5th year	69	213.95	97.94	10.84			

*n: number of participants; Mean: arithmetic mean; SD: standard deviation. $p < 0.05$

Table 7: Mann–Whitney U Test Results for the Empathy and Humanism, Professional Relationship and Development, and Responsibility Subscales

Subscales	Class	n	Mean	SD	Mean Rank	Median	U	p	Effect Size
Empathy and Humanism	3	75	45.8	3.59	130.24	47	6918	0.71	0.02
	4 and 5	190	45.6	4.53	134.09	47			
Professional Relationship and Development	3	75	34.22	3.26	116.05	34	5854	0.023*	0.14
	4 and 5	190	35.15	3.69	139.69	35			
Responsibility	3	75	16.50	1.84	116.97	16	5922	0.03*	0.13
	4 and 5	190	17.02	2.18	139.33	17			

*: n: number of participants; Mean: arithmetic mean; SD: standard deviation; U: Mann–Whitney U test statistic. $p < 0.05$.

According to the Kruskal–Wallis test results examining differences in total professionalism scores across year levels, no statistically significant differences were observed ($p = 0.149 > 0.05$) (Table 7). Mann–Whitney U test results for the Empathy–Humanism, Professional Relationship and Development, and Responsibility subscales are presented in Table 7, and corresponding box plots are shown in Figures 2, 3, and 4, respectively.

Based on the Mann–Whitney U analysis, the median scores of the “Professional Relationship and Development” and “Responsibility” subscales differed significantly between

third-year students and those in the clinical years (fourth and fifth years) ($p < 0.05$). The median score for the Professional Relationship and Development subscale was higher in the clinical group (35) than in third-year students (34), and this difference was statistically significant ($p = 0.023 < 0.05$). Similarly, the median Responsibility subscale score was higher among fourth- and fifth-year students (17) than among third-year students (16), representing a significant difference ($p = 0.03 < 0.05$). In contrast, no statistically significant differences were found between the groups for the Empathy–Humanism subscale ($p = 0.71 > 0.05$).

Discussion

In the present study, the professionalism attitudes of dental students were evaluated across year levels, and the impact of clinical training experience on the subscales of professionalism was examined. The findings indicated that overall professionalism levels did not differ significantly between year levels; however, students in the clinical years demonstrated significantly higher scores in the “Professional Relationship and Development” and “Responsibility” subscales. This suggests that the components of professionalism do not develop simultaneously and that attitudes related to clinical experience mature more prominently.

In the study conducted by Amritha et al. (11) across four dental schools in India, internship-year dental students exhibited the highest professionalism scores, and these differences were statistically significant. The authors attributed this finding to interns’ career-oriented approaches, heightened sense of responsibility toward patients and society, and increased opportunities to directly observe dentist–patient interactions. The same study also reported an upward trend in “empathy–humanism” scores as years of education increased, with empathy gradually improving from the first year but showing a slight decline in the final year. Similarly, the significant increases observed in the Professional Relationship and Development and Responsibility subscales among fourth- and fifth-year students in our study align with the findings of Amritha et al. Active engagement in clinical practice appears to contribute meaningfully to students’ development of professional identity and accountability. This parallel highlight that professionalism is reinforced not only through theoretical instruction but also through observational learning and role modeling enabled by direct patient interaction.

Studies conducted in Türkiye further support these findings. Kaşalı et al. (10) confirmed the three-factor structure of the PAS-TR in dental students (Cronbach's $\alpha = 0.90$) and reported mean scores comparable with those observed in our study. Tanrıverdi et al. (9) similarly demonstrated that the scale is valid and reliable among medical students, emphasizing the strong internal consistency of the empathy–humanism subdimension. In contrast, the lack of significant differences in empathy–humanism scores across year levels in our study suggests that these attitudes may be acquired early and remain stable throughout training. Additionally, Barnhoorn (12) noted that professionalism assessments largely measure “beliefs,” which may not always directly correspond to observable behavioral outcomes.

This study has several limitations. First, its cross-sectional design does not allow causal interpretations regarding changes in professionalism attitudes over time. Second, the PAS-TR is a self-report instrument, which may have introduced social desirability bias in students' responses. Third, the study sample was limited to the students of a single dental school, which may restrict the generalizability of the findings; variations in curricula, clinical training intensity, and instructional approaches across different institutions may influence professionalism attitudes to differing extents.

Conclusion

This study demonstrated that overall professionalism attitudes among dental students did not differ significantly across year levels; however, substantial increases were observed in the Professional Relationship and Development and Responsibility subscales among students in the clinical years. These findings suggest that the components of professionalism do not evolve uniformly and that areas linked to clinical experience show more pronounced maturation. Integrating professionalism training with clinical practice and reinforcing it through mentorship, feedback, and other supportive educational strategies is recommended.

Conflict of Interest

The authors declare no conflict of interest.

Funding

No funding was received.

References

1. ABIM Foundation, ACP-ASIM Foundation, & European Federation of Internal Medicine. (2002). Medical professionalism in the new millennium: A physician charter. *Annals of Internal Medicine*, 136(3), 243–246. doi:10.7326/0003-4819-136-3-200202050-00012
2. Epstein, R. M., & Hundert, E. M. (2002). Defining and assessing professional competence. *JAMA*, 287(2), 226–235. doi:10.1001/jama.287.2.226
3. Holmboe, E. S., Edgar, L., & Hamstra, S. (2016). *The milestones guidebook*. Chicago, IL: Accreditation Council for Graduate Medical Education.
4. Zijlstra-Shaw, S., Robinson, P. G., & Roberts, T. (2012). Assessing professionalism within dental education: The need for a definition. *European Journal of Dental Education*, 16(1), e128–e136. doi:10.1111/j.1600-0579.2011.00687.x
5. Nguyen, T. M., Jones, D., Ngo, K. L., & Hayes, M. J. (2017). Developing professionalism in dentistry: A systematic review. *MedEdPublish*, 6, 85. doi:10.15694/mep.2017.000085
6. Papadakis, M. A., Teherani, A., Banach, M. A., Knettler, T. R., Rattner, S. L., Stern, D. T., ... Hodgson, C. S. (2005). Disciplinary action by medical boards and prior behavior in medical school. *New England Journal of Medicine*, 353(25), 2673–2682.
7. McMullan, R. D., Churrua, K., Hibbert, P., Li, L., Ash, R., Urwin, R., ... Westbrook, J. I. (2024). Co-worker unprofessional behaviour and patient safety risks: An analysis of co-worker reports across eight Australian hospitals. *International Journal for Quality in Health Care*, 36(2), mzae030. doi:10.1093/intqhc/mzae030
8. Klemenc-Ketiš, Z., & Vrečko, H. (2014). Development and validation of a professionalism assessment scale for medical students. *International Journal of Medical Education*, 5, 205–211. doi:10.5116/ijme.544b.7972
9. Tanrıverdi, E. Ç., Nas, M. A., Kaşali, K., Layık, M. E., & El-Aty, A. A. (2023). Validity and reliability of the Professionalism Assessment Scale in Turkish medical students. *PLOS ONE*, 18(1), e0281000. doi:10.1371/journal.pone.0281000
10. Kaşali, K., Eminoğlu, D. Ö., Üstündağ, Ş. D., & Tanrıverdi, E. Ç. (2024). Türk Diş Hekimliği Öğrencilerinde Mesleki Değerlendirme Ölçeğinin Geçerliliği ve Güvenilirliği. *Current Research in Health Sciences*, 1(3), 115–122.

11. Amritha, N., Vanishree, M. K., Chandra, K. M., & Babu, P. (2019). Assessment of dental students' attitudes and perceptions toward professionalism. *Journal of Indian association of public health dentistry*, 17(1), 19-24.
12. Barnhoorn, P. (2015). What does a professionalism assessment scale measure?. *International Journal of Medical Education*, 6, 62.



Volume 6 / Issue 2 / August 2026

Research Article

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

Mehmet Murat Taskan^{1*}, Ozkan Karatas¹, Elif Sirma Taskan²

¹Tokat Gaziosmanpasa University, Faculty of Dentistry, Department of Periodontology, Tokat, Turkey.

²Sirma Pharmacy, Specialist Pharmacist, Tokat, Turkey.

*Corresponding author: mmtaskan@gmail.com

Taskan, Mehmet Murat., Karatas, Ozkan., Taskan, Elif Sirma. "Quality of Turkish Online Information on Antibiotic Use in Periodontal Treatment: A Web-Based Analysis". *Acta Stomatologica Cappadocia*. 6;2 (August 2026): 15-29.

DOI: <https://doi.org/10.54995/ASC.6.2.2>

Received: 04.05.2026; Accepted: 07.08.2026

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



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

Mehmet Murat Taskan, Ozkan Karatas, Elif Sirma Taskan

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).

References

1. Eysenbach G. Infodemiology: the epidemiology of (mis)information. *Am J Med* 2002;113:763-765.
2. Eysenbach G. Infodemiology and infoveillance: framework for an emerging set of public health informatics methods to analyze search, communication and publication behavior on the Internet. *Am J Prev Med* 2011;40:S154-S158.
3. Silberg WM, Lundberg GD, Musacchio RA. Assessing, controlling, and assuring the quality of medical information on the Internet: Caveant lector et viewor--Let the reader and viewer beware. *JAMA* 1997;277:1244-1245.

4. Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Community Health* 1999;53:105-111.
5. Bizzi I, Ghezzi P, Paudyal P. Health information quality of websites on periodontology. *J Clin Periodontol* 2017;44:308-314.
6. Kanmaz B, Buduneli N. Evaluation of information quality on the internet for periodontal disease patients. *Oral Dis* 2021;27:348-356.
7. Daltaban O, Ustun K. The quality of information about periodontal disease in Turkish Internet sites. *Akd Med J* 2022;8:128-133.
8. Chestnutt IG. The nature and quality of periodontal related patient information on the world-wide web. *Br Dent J* 2002;193:657-659.
9. Sanz M, Herrera D, Kebschull M, Chapple I, et al. Treatment of stage I-III periodontitis- The EFP S3 level clinical practice guideline. *J Clin Periodontol* 2020;47:4-60.
10. Teughels W, Feres M, Oud V, Martín C, et al. Adjunctive effect of systemic antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol* 2020;47:257-281.
11. Herrera D, Matesanz P, Bascones-Martínez A, Sanz M. Adjunctive effect of locally delivered antimicrobials in periodontitis therapy: a systematic review and meta-analysis. *J Clin Periodontol* 2020;47:239-256.
12. Herrera D, Alonso B, León R, Roldán S, et al. Antimicrobial therapy in periodontitis: the use of systemic antimicrobials against the subgingival biofilm. *J Clin Periodontol* 2008;35:45-66.
13. Khattri S, Kumbargere Nagraj S, Arora A, Eachempati P, et al. Adjunctive systemic antimicrobials for the non-surgical treatment of periodontitis. *Cochrane Database Syst Rev* 2020;11:CD012568.
14. Feres M, Figueiredo LC, Soares GM, Faveri M. Systemic antibiotics in the treatment of periodontitis. *Periodontol 2000* 2015;67:131-186.
15. Haffajee AD, Socransky SS, Gunsolley JC. Systemic anti-infective periodontal therapy. A systematic review. *Ann Periodontol* 2003;8:115-181.
16. Slots J. Selection of antimicrobial agents in periodontal therapy. *J Periodontal Res* 2002;37:389-398.

17. Rams TE, Degener JE, van Winkelhoff AJ. Antibiotic resistance in human chronic periodontitis microbiota. *J Periodontol* 2014;85:160-169.
18. Pretzl B, Sälzer S, Ehmke B, Schlagenhauf U, et al. Administration of systemic antibiotics during non-surgical periodontal therapy-a consensus report. *Clin Oral Investig* 2019;23:3073-3085.
19. Yıldız MS, Akgul Z, Gunpinar S. Antibiotic prescription practices of periodontology specialists in Turkey: a cross-sectional web-based questionnaire study. *Popul Med* 2023;5:6.
20. Gillam DG, Turner W. Antibiotics in the treatment of periodontal disease: a guide for the general dental practitioner. *Prim Dent J* 2014;3:43-47.
21. Kapoor A, Malhotra R, Grover V, Grover D. Systemic antibiotic therapy in periodontics. *Dent Res J (Isfahan)* 2012;9:505-515.
22. Ong A, Kim J, Loo S, Quaranta A, et al. Prescribing trends of systemic antibiotics by periodontists in Australia. *J Periodontol* 2019;90:982-992.
23. Agossa K, Sy K, Mainville T, Gosset M, et al. Antibiotic use in periodontal therapy among French dentists and factors which influence prescribing practices. *Antibiotics (Basel)* 2021;10:303.
24. World Health Organization. Global action plan on antimicrobial resistance. Geneva: World Health Organization; 2015.
25. World Health Organization. WHO AWaRe antibiotic book. Geneva: World Health Organization; 2022.
26. O'Neill J. Tackling drug-resistant infections globally: final report and recommendations. London: Review on Antimicrobial Resistance; 2016.
27. Ateşman E. Türkçede okunabilirliğin ölçülmesi. *Dil Dergisi* 1997;58:171-174.
28. Bezirci B, Yılmaz AE. Metinlerin okunabilirliğinin ölçülmesi üzerine bir yazılım kütüphanesi ve Türkçe için yeni bir okunabilirlik ölçütü. *DEÜ FMD* 2010;12:49-62.



Volume 6 / Issue 2 / August 2026

Research Article

Adult Patients' Perceptions and Preferences Toward Accelerated Orthodontic Treatment Perceptions of Accelerated Orthodontic Treatment

Hanan Miftah Ashour¹, Göksu Trakyalı^{2*}

¹Yeni Yuzyil University, Faculty of Dentistry, Department of Orthodontics, Istanbul, Turkey.

²Istanbul Nisantasi University, Faculty of Dentistry, Department of Orthodontics, Istanbul, Turkey.

*Corresponding author: goksu.trakyalı@nisantasi.edu.tr

Ashour, Hanan Miftah., Trakyalı, Göksu. "Adult Patients' Perceptions And Preferences Toward Accelerated Orthodontic Treatment Perceptions of Accelerated Orthodontic Treatment". *Acta Stomatologica Cappadocia*. 6;2 (August 2026): 30-43.

DOI: <https://doi.org/10.54995/ASC.6.2.3>

Received: 10.08.2026; Accepted: 28.08.2026

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



Adult Patients' Perceptions and Preferences Toward Accelerated Orthodontic Treatment Perceptions of Accelerated Orthodontic Treatment

Hanan Miftah Ashour, Göksu Trakyalı

Abstract

Statement of the Problem: Prolonged orthodontic treatment may discourage adults from initiating or continuing orthodontic care. Several approaches have been proposed to accelerate orthodontic treatment, but their acceptance by patients may vary according to invasiveness and cost.

Purpose: This study aimed to evaluate adult patients' perceptions of orthodontic treatment duration, their acceptance and preferences regarding invasive and non-invasive approaches to accelerate treatment, and their willingness to pay additional fees.

Materials and Methods: This hospital-based cross-sectional study included adult patients receiving orthodontic treatment at İstanbul Yeni Yüzyıl University Faculty of Dentistry between October and December 2021. A 21-item questionnaire adapted from a previously published survey was administered electronically through Google Forms. The questionnaire assessed demographic characteristics, perceptions and expectations regarding treatment duration, acceptance and ranking of acceleration techniques, and willingness to pay additional fees. Data were analyzed using IBM SPSS Statistics 25. Friedman's test with pairwise post-hoc comparisons, Spearman correlation, and rank-biserial correlation were used, with statistical significance set at $p < 0.05$.

Results: Of 300 distributed questionnaires, 295 were returned and 293 eligible participants were included. Overall, 87.3% of participants agreed that orthodontic treatment takes a long time, while 85.7% considered prolonged treatment a reason why adults may avoid orthodontic treatment. Although only 14.7% expected treatment to last less than one year, 65.5% desired treatment to be completed within one year. Overall, 70.9% were willing to undergo an additional procedure to accelerate treatment. Customized wires were the most accepted approach (89.1%), followed by vibration devices (69.6%), whereas intraoral injected drugs (28.7%), piezocision (8.2%), and corticotomy (5.2%) were less accepted. Nearly half of the participants (48.4%) were willing to pay higher monthly fees for shorter treatment.

Conclusions: Adult patients demonstrated a strong preference for shorter orthodontic treatment. Non-invasive approaches, particularly customized wires and vibration devices, were substantially more acceptable than invasive procedures. Financial considerations also influenced willingness to pay for treatment acceleration.

Keywords: Orthodontics, orthodontic appliances, patient preference, patient satisfaction, time factors.

Yetişkin Hastaların Hızlandırılmış Ortodontik Tedaviye İlişkin Algı ve Tercihleri Hızlandırılmış Ortodontik Tedavi Tercihleri

Hanan Miftah Ashour, Göksu Trakyalı

Özet

Problem: Uzun süren ortodontik tedavi, yetişkin hastaların ortodontik tedaviye başlamasını veya tedaviyi sürdürmesini olumsuz etkileyebilmektedir. Ortodontik tedaviyi hızlandırmaya yönelik çeşitli yöntemler geliştirilmiş olmakla birlikte, hastaların bu yöntemleri kabulü invazivlik ve maliyet gibi faktörlere bağlı olarak değişebilmektedir.

Amaç: Bu çalışmanın amacı, yetişkin hastaların ortodontik tedavi süresine ilişkin algılarını, tedaviyi hızlandırmaya yönelik invaziv ve non-invaziv yöntemlere ilişkin kabul ve tercihlerini ve ek ücret ödeme istekliliklerini değerlendirmektir.

Gereç ve Yöntem: Bu hastane temelli kesitsel çalışma, Ekim-Aralık 2021 tarihleri arasında İstanbul Yeni Yüzyıl Üniversitesi Diş Hekimliği Fakültesi'nde ortodontik tedavi gören yetişkin hastalar üzerinde gerçekleştirildi. Daha önce yayımlanmış bir çalışmadan uyarlanan 21 soruluk anket Google Forms aracılığıyla elektronik olarak uygulandı. Ankette demografik özellikler, tedavi süresine ilişkin algı ve beklentiler, hızlandırma yöntemlerinin kabulü ve sıralanması ile ek ücret ödeme istekliliği değerlendirildi. Veriler IBM SPSS Statistics 25 kullanılarak analiz edildi. Friedman testi ve ikili post-hoc karşılaştırmalar, Spearman korelasyonu ve rank-biserial korelasyon kullanıldı ve $p < 0.05$ istatistiksel olarak anlamlı kabul edildi.

Bulgular: Dağıtılan 300 anketin 295'i geri alındı ve uygunluk kriterlerini karşılayan 293 katılımcı çalışmaya dahil edildi. Katılımcıların %87.3'ü ortodontik tedavinin uzun sürdüğünü düşünürken, %85.7'si uzun tedavi süresini yetişkinlerin tedaviden kaçınmasının bir nedeni olarak değerlendirdi. Yalnızca %14.7'si tedavinin bir yıldan kısa süreceğini öngörürken, %65.5'i tedavinin bir yıl içinde tamamlanmasını istedi. Katılımcıların %70.9'u tedaviyi hızlandırmak amacıyla ek bir işlem uygulanmasını kabul edeceğini belirtti. Özelleştirilmiş teller (%89.1) ve titreşim cihazları (%69.6) en fazla kabul edilen yöntemler olurken, intraoral ilaç enjeksiyonu (%28.7), piezokizyon (%8.2) ve kortikotomi (%5.2) daha düşük kabul oranlarına sahipti. Katılımcıların %48.4'ü daha kısa tedavi için daha yüksek aylık ücret ödeyebileceğini belirtti.

Sonuç: Yetişkin hastalar daha kısa ortodontik tedavi süresine belirgin bir tercih göstermiştir. Özellikle özelleştirilmiş teller ve titreşim cihazları gibi non-invaziv yöntemler invaziv yöntemlere göre daha fazla kabul görmüştür. Tedavi hızlandırmaya yönelik ek ücret ödeme istekliliğinde ekonomik faktörler de etkili olmuştur.

Anahtar Kelimeler: Hasta memnuniyeti, hasta tercihi, ortodonti, ortodontik apareyler, zaman faktörleri.

Introduction

Orthodontic treatment is often perceived as time-consuming, and prolonged treatment may influence both patients' willingness to initiate treatment and their experience during therapy. A conventional fixed-appliance treatment course is commonly close to two years, although the duration varies according to malocclusion severity, treatment modality, patient cooperation, and other clinical factors (1,2).

Longer treatment has been associated with several biological and psychosocial concerns, including greater difficulty maintaining oral hygiene, risk of enamel decalcification, periodontal complications, root resorption, treatment fatigue, and dissatisfaction with the appearance of orthodontic appliances (1,3). These concerns are particularly relevant in adults, who may seek treatment for specific aesthetic, social, or professional reasons and may therefore place a high value on treatment efficiency.

Several approaches have been investigated to accelerate orthodontic tooth movement. These include biological interventions, physical or mechanical stimulation, customized orthodontic appliances, and surgically facilitated procedures (1,4). Surgical approaches such as corticotomy and piezocision may produce biological effects associated with accelerated remodeling, but their invasiveness and postoperative discomfort may limit patient acceptance (5,6). Similarly, evidence concerning vibrational devices remains mixed, with systematic reviews reporting inconsistent effects on the rate of tooth movement and overall treatment duration (7).

Patient acceptance is therefore an important component of the clinical feasibility of accelerated orthodontic procedures. Previous surveys have shown that patients generally prefer less invasive approaches and that willingness to pay additional fees is influenced by perceived treatment-time reduction and financial circumstance (8,9). However, perceptions may differ between populations because treatment expectations, socioeconomic conditions, and cultural factors vary.

To date, the thesis underlying the present study identified a lack of published Turkish data specifically addressing adult patients' perceptions of orthodontic treatment duration, acceptance of acceleration procedures, and willingness to pay additional fees. The present study therefore aimed to evaluate these factors in adult Turkish orthodontic patients. The primary

objectives were to determine (1) patients' perceptions and desired duration of orthodontic treatment, (2) the extent to which prolonged treatment is perceived as a barrier to orthodontic care, (3) acceptance and preference for selected invasive and non-invasive acceleration techniques, and (4) willingness and capacity to pay additional treatment fees.

Materials and Methods

Study design and setting

This hospital-based, cross-sectional study was conducted in the Department of Orthodontics, Faculty of Dentistry, İstanbul Yeni Yüzyıl University, İstanbul, Türkiye, between October and December 2021. The study population consisted of adult patients actively receiving orthodontic treatment.

Ethical considerations

Ethical approval was obtained from the Ethics and Research Committee of İstanbul Yeni Yüzyıl University (Approval No. 2021/10-717, dated 05.10.2021). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki, as revised in 2013. All participants were informed about the purpose and procedures of the study and written informed consent was obtained before participation. Participation was voluntary, and the questionnaire was completed anonymously.

Sample size and participant selection

The primary inferential outcome was participants' preference among five orthodontic treatment-acceleration approaches. Because the primary comparison involved five related ordinal responses, the final analysis used Friedman's test. A priori sample-size planning was performed with G*Power 3.1 using the corresponding five-category omnibus comparison as a conservative approximation: chi-square goodness-of-fit, 5 categories, two-sided $\alpha=0.05$, 80% power, and a small-to-moderate effect size ($w=0.20$). This analysis indicated a minimum sample size of 299 participants. A total of 300 questionnaires were therefore distributed. Of the 295 returned questionnaires, two were excluded according to the eligibility criteria, resulting in 293 participants. Thus, the final analysable sample was slightly below the conservative a priori target (293 vs 299); however, the study retained high participation and provided sufficient data for the planned descriptive and nonparametric analyses.

Adult patients attending routine orthodontic appointments at the Department of Orthodontics, aged ≥ 18 years were invited to participate in the survey. Patients younger than 18 years, individuals with craniofacial disorders or disabilities that prevented participation, and individuals who did not consent were excluded.

Questionnaire

A 21-question questionnaire adapted from Uribe et al. (8), was administered electronically using Google Forms. The survey was distributed through the WhatsApp application. Before answering questions concerning acceleration techniques, participants were provided with descriptions of the procedures. The questionnaire comprised five sections: demographic characteristics; perceptions and expectations regarding orthodontic treatment duration; willingness to undergo invasive and non-invasive acceleration procedures; ranking of procedures according to preference and estimated treatment-time reduction; and ability and willingness to pay additional fees.

The acceleration approaches evaluated were customized orthodontic wires/appliances, teeth vibration devices, intraoral injected drugs, corticotomy, and piezocision. Participants rated their willingness using ordered response categories and ranked the techniques according to preference. Additional questions assessed the percentage of fee increase participants would accept for different procedures and different hypothetical reductions in treatment duration.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Categorical data were summarized as frequencies and percentages. Friedman's test with pairwise post-hoc comparisons was used to compare the ranked willingness to undergo the five treatment-acceleration approaches. Spearman correlation coefficients were used to examine associations involving ordinal variables, while rank-biserial correlation coefficients were used for appropriate ordinal/binary associations. Statistical significance was set at $p < 0.05$. The a priori power analysis was performed using G*Power version 3.1.9.7 (Heinrich Heine University Düsseldorf, Düsseldorf, Germany). Because G*Power does not provide a direct Friedman-test sample-size module, the primary five-category comparison was conservatively approximated using the chi-square goodness-of-fit procedure with five categories, an effect size of $w = 0.20$, $\alpha = 0.05$, and power $(1 - \beta) = 0.80$. The resulting required sample size was 299 participants.

Results

Participant characteristics

Of the 300 questionnaires distributed, 295 were returned and 293 eligible participants were included, corresponding to a 98.3% participation rate. The sample comprised 116 males (39.6%), 176 females (60.1%), and one participant with missing sex information. The largest age group was 18–20 years (43.3%), followed by 20–30 years (41.3%), 30–40 years (9.9%), and above 40 years (3.8%); age was missing for five participants (1.7%).

Regarding education, 46.1% had less than four years of college education, 45.1% had completed four years of college, and 8.2% had a postgraduate degree. Monthly income was below 2000 TL for 6.5%, 2000–6000 TL for 53.9%, 6000–9000 TL for 29.0%, and above 9000 TL for 8.2%; income was missing for 2.4%. Regarding treatment duration at the time of the survey, 16.7% had been in treatment for less than one year, 43.0% for 1–2 years, and 26.3% for 2–3 years.

Table 1. Sociodemographic and treatment characteristics of the study participants (N=293).

Characteristic	n (%)
Male	116 (39.6)
Female	176 (60.1)
Missing sex	1 (0.3)
18–20 years	127 (43.3)
20–30 years	121 (41.3)
30–40 years	29 (9.9)
>40 years	11 (3.8)
Missing age	5 (1.7)
Less than 4 years college	135 (46.1)
4 years college	132 (45.1)
Postgraduate degree	24 (8.2)
Income <2000 TL	19 (6.5)
2000–6000 TL	157 (53.9)
6000–9000 TL	85 (29.0)
>9000 TL	24 (8.2)
Treatment <1 year	49 (16.7)
Treatment 1–2 years	126 (43.0)
Treatment 2–3 years	77 (26.3)

Perceptions and expectations regarding treatment duration

A total of 87.3% of participants agreed that orthodontic treatment takes a long time (41.6% strongly agreed and 45.7% somewhat agreed). There was no statistically significant association between sex and this perception ($p=0.094$). A mild positive association was

observed between education level and agreement that orthodontic treatment takes a long time ($p=0.001$, $r=0.199$).

Regarding expected treatment duration, 14.7% expected treatment to last less than one year, 26.3% expected 1–1.5 years, 36.2% expected 1.5–2 years, and 22.2% expected more than two years. In contrast, 65.5% wished their treatment could be completed in less than one year, 21.5% wished for 1–1.5 years, and 13.0% for 1.5–2 years. No participant selected more than two years as a desired duration. Male sex showed a mild association with wishing for a shorter treatment duration ($p=0.029$, $r=0.128$).

When asked why adults may reject or avoid orthodontic treatment, prolonged treatment duration was the most frequently selected reason (85.7%), followed by high cost (70.6%) and pain (51.5%). No significant associations were observed between these reasons and sex ($p=0.474$), education ($p=0.416$), or monthly income ($p=0.674$).

Table 2. Participants' perceptions, expectations, and desired orthodontic treatment duration.

Outcome	n (%)
Agreed treatment takes a long time	256 (87.3)
Expected <1 year	43 (14.7)
Expected 1–1.5 years	77 (26.3)
Expected 1.5–2 years	106 (36.2)
Expected >2 years	65 (22.2)
Wished <1 year	192 (65.5)
Wished 1–1.5 years	63 (21.5)
Wished 1.5–2 years	38 (13.0)
Long treatment as reason for rejection/avoidance	251 (85.7)
High cost as reason	207 (70.6)
Pain as reason	151 (51.5)

Acceptance of acceleration procedures

Overall, 70.9% of participants agreed that they would undergo additional techniques or procedures to accelerate orthodontic treatment (39.2% strongly agreed and 31.7% somewhat agreed). A mild association was observed between sex and willingness to undergo acceleration procedures ($p=0.012$, $r=0.146$), with greater agreement among males. Higher monthly income was also associated with greater willingness ($p=0.048$, $r=0.118$).

Customized wires were the most accepted approach, with 89.1% of participants indicating willingness to use them. Teeth vibration was accepted by 69.6%. For intraoral

injected drugs, 28.7% were willing, 30.7% were neutral, and 40.6% were unwilling. Only 5.2% were willing to undergo corticotomy, while 81.2% were unwilling. Piezocision was accepted by 8.2%, while 77.8% were unwilling.

Table 3. Acceptance and preference ranking of orthodontic treatment-acceleration techniques.

Technique	Willing n (%)	Neutral n (%)	Unwilling n (%)	Mean rank
Customized wires	264 (89.1)	24 (8.2)	5 (1.7)	4.60
Teeth vibrator	204 (69.6)	67 (22.9)	21 (7.1)	3.76
Intraoral injected drug	84 (28.7)	90 (30.7)	119 (40.6)	3.07
Piezocision	24 (8.2)	40 (13.7)	228 (77.8)	1.81
Corticotomy	16 (5.2)	38 (13.0)	238 (81.2)	1.77

The Friedman test demonstrated significant differences in preference among the evaluated approaches ($p < 0.001$). Customized wires ranked significantly higher than the other approaches. Teeth vibration ranked significantly higher than intraoral injected drugs, corticotomy, and piezocision. Intraoral injected drugs ranked significantly higher than the two surgical approaches. No significant difference was found between corticotomy and piezocision ($p = 1.000$).

Preferences according to estimated reduction in treatment duration

When participants were asked to rank procedures considering their estimated reduction in treatment duration, customized wires, associated with a 25–35% reduction, were the first choice for 86.5% of participants. Teeth vibration, associated with a 30% reduction, was the first choice for 73.4%. Corticotomy and piezocision, each presented with an estimated 50% reduction, were predominantly placed in fourth position, by 84.6% and 61.3%, respectively.

Willingness and ability to pay additional fees

Overall, 48.4% of participants reported that they were able to pay higher monthly payments to reduce treatment duration (13.3% very able and 35.1% somewhat able), whereas 19.3% were unable and 30.7% were neutral. Male sex was associated with greater ability to pay additional monthly fees ($p = 0.002$, $r = 0.182$), and higher monthly income was also associated with greater ability to pay ($p = 0.002$, $r = 0.185$).

For customized wires, 70.6% of participants willing to use the technique accepted a 10% fee increase and 16.0% accepted a 20% increase. For teeth vibration, 75.8% accepted a 10%

increase and 9.6% accepted a 20% increase. For intraoral injected drugs, 50.9% accepted a 10% increase and 7.8% accepted a 20% increase. Among respondents who answered for surgical procedures, 30.7% accepted a 10% increase for corticotomy and 32.8% accepted a 10% increase for piezocision; a large proportion left these items unanswered because they had already rejected the procedures.

Table 4. Preferred fee increase according to hypothetical reduction in orthodontic treatment duration.

Reduction in treatment time	10% fee	20% fee	30% fee	40% fee	50% fee
10%	267 (91.4)	13 (4.5)	5 (1.7)	2 (0.7)	3 (1.0)
20%	228 (78.1)	49 (16.8)	7 (2.4)	3 (1.0)	3 (1.0)
30%	176 (60.3)	73 (25.0)	37 (12.7)	2 (0.7)	3 (1.0)
40%	121 (41.4)	112 (38.4)	23 (7.9)	30 (10.3)	3 (1.0)
50%	86 (29.5)	107 (36.6)	56 (19.2)	11 (3.8)	30 (10.3)

Discussion

The present study demonstrates that treatment duration is a major concern among adult Turkish orthodontic patients. Most participants (87.3%) agreed that orthodontic treatment takes a long time, and 85.7% identified prolonged treatment as a reason adults may reject or avoid orthodontic treatment. This finding is consistent with previous patient surveys in which treatment duration was identified as an important concern and a substantial proportion of participants expressed a desire for shorter treatment (8,9).

An important finding was the difference between patients' expectations and their desired treatment duration. Only 14.7% expected treatment to last less than one year, whereas 65.5% wished to complete treatment within one year. This discrepancy suggests that patients may understand that conventional orthodontic treatment commonly requires substantially more than one year but nevertheless desire a shorter course. Previous Saudi studies similarly demonstrated a strong preference for reduced treatment duration among young adult patients (8,9).

The high overall willingness to undergo additional procedures (70.9%) should, however, be interpreted in conjunction with the marked differences between individual techniques. Customized wires were by far the most accepted option, followed by vibratory devices. These findings are consistent with previous surveys showing that patients tend to prefer

approaches that resemble conventional orthodontic treatment and do not require surgical intervention (8,9).

The strong preference for customized wires is clinically understandable because the intervention can be perceived as an extension of conventional orthodontic mechanics rather than as an invasive procedure. Nevertheless, patient preference should not be interpreted as evidence of clinical efficacy. The evidence concerning acceleration by customized appliances remains limited, and the clinician should distinguish perceived convenience from demonstrated reduction in treatment duration.

Vibratory devices were the second most accepted approach in the present study. This high acceptance contrasts with the uncertainty of the clinical evidence. A systematic review of randomized and controlled clinical studies found that most included trials did not demonstrate a clinically meaningful advantage of vibrational devices in tooth movement, total treatment time, or pain (7). Therefore, the high patient acceptance observed in the present study may reflect the non-invasive nature and perceived convenience of these devices rather than established clinical effectiveness.

In contrast, surgical techniques showed very low acceptance. Only 5.2% of participants were willing to undergo corticotomy and 8.2% were willing to undergo piezocision. This result is consistent with previous surveys reporting lower acceptance of invasive approaches and greater preference for non-invasive alternatives (8,9). The invasive nature of corticotomy and piezocision, the possibility of postoperative discomfort, and patients' concern about surgical procedures may explain this pattern. Although piezocision may be less invasive than conventional corticotomy, it still involves surgical manipulation and therefore may remain unacceptable to many patients.

The financial findings further demonstrate that patient acceptance is influenced by cost. Less than half of the participants (48.4%) reported an ability to pay higher monthly fees for shorter treatment. Higher income was significantly associated with greater ability to pay. For the most accepted non-invasive approaches, the majority of participants preferred a 10% rather than a larger fee increase. This finding is broadly consistent with previous work de-

monstrating that patients are generally willing to pay additional fees for accelerated orthodontics but that the acceptable increase is constrained by the magnitude of the financial burden (8,9).

The present findings also have implications for patient-centered treatment planning. Patients may value a shorter treatment period highly, but the willingness to accept an acceleration procedure depends on invasiveness, perceived convenience, and financial cost. Orthodontists should therefore discuss the actual evidence supporting each acceleration method, potential adverse effects, expected magnitude of benefit, and additional cost rather than assuming that patient preference alone indicates clinical appropriateness.

Limitations

The study has several limitations. First, its cross-sectional design prevents causal inference and may be affected by information and response biases. Second, participants were recruited from a single university dental hospital in İstanbul, which limits the generalizability of the findings to the wider Turkish adult orthodontic population. Third, the study assessed stated preferences rather than actual uptake of acceleration procedures or objectively measured reductions in treatment duration. Finally, some fee-increase questions were unanswered by participants who had already rejected the relevant invasive procedure, which limits interpretation of willingness-to-pay estimates for those procedures.

Future research

Future multicentre studies involving a broader range of Turkish orthodontic patients are needed to confirm these findings. Studies combining patient-reported preferences with evidence-based information on the actual effectiveness, risks, and costs of individual acceleration techniques could provide a more clinically useful assessment of patient decision-making.

Conclusion

Adult Turkish orthodontic patients showed a strong desire for shorter treatment durations and identified prolonged treatment as the leading reason adults may reject or avoid orthodontic treatment. Although most participants were willing to consider an additional approach to accelerate treatment, acceptance was strongly dependent on invasiveness. Customized

wires and vibratory devices were the most acceptable options, whereas corticotomy and piezocision were poorly accepted. Nearly half of the participants were able to pay additional fees, but most preferred modest increases, particularly around 10%. These findings support the importance of incorporating patient preferences and financial considerations into shared decision-making while ensuring that recommendations remain grounded in the available clinical evidence.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available because they contain survey data obtained under the approved study protocol but may be available from the corresponding author on reasonable request, subject to applicable ethical and institutional restrictions.

Competing interests: The authors declare that they have no competing interests.

Funding: No specific funding was reported for this study.

Authors' contributions: Hanan Miftah Ashour and Göksu Trakyali contributed to the conception and design of the study, data collection, interpretation of the findings, and preparation/revision of the manuscript. Both authors approved the final version. Hanan Miftah

Ashour contributed to the conceptualization, methodology, validation, formal analysis, investigation and writing of original draft. Göksu Trakyali contributed to the reviewing and editing of original draft, visualization, project administration and supervision..

References

1. Nimeri G, Kau CH, Abou-Kheir NS, Corona R. Acceleration of tooth movement during orthodontic treatment—a frontier in orthodontics. *Prog Orthod*. 2013;14:42.
2. Uribe F, Padala S, Allareddy V, Nanda R. Patients', parents', and orthodontists' perceptions of the need for and costs of additional procedures to reduce treatment time. *Am J Orthod Dentofacial Orthop*. 2014;145(4 Suppl):S65-S73.
3. Linjawi AI, Abushal AM, Al-Zahrani AM, Bakhamis B. Patients' perceptions to reduced orthodontic treatment time in Saudi Arabia. *Patient Prefer Adherence*. 2019;13:1973-1981.

4. Linjawwi AI, Abushal AM. Young adults' preferences and willingness to pay for invasive and non-invasive accelerated orthodontic treatment: a comparative study. *Inquiry*. 2020;57:46958020963595.
5. Charavet C, Lecloux G, Bruwier A, Rompen E, Maes N, Limme M, Lambert F. Localized piezoelectric alveolar decortication for orthodontic treatment in adults: a randomized controlled trial. *J Dent Res*. 2016;95(9):1003-1009.
6. Nimeri G, Kau CH, Abou-Kheir NS, Corona R. Acceleration of tooth movement during orthodontic treatment—a frontier in orthodontics. *Prog Orthod*. 2013;14:42.
7. Aljabaa A, Almoammar K, Aldrees AM, Huang G. Effects of vibrational devices on orthodontic tooth movement: a systematic review. *Am J Orthod Dentofacial Orthop*. 2018;154(6):768-779.
8. Jing D, Xiao J, Li X, Li Y, Zhao Z. The effectiveness of vibrational stimulus to accelerate orthodontic tooth movement: a systematic review. *BMC Oral Health*. 2017;17:143.
9. Tsihlaki A, Chin SY, Pandis N, Fleming PS. How long does treatment with fixed orthodontic appliances last? A systematic review. *Am J Orthod Dentofacial Orthop*. 2016;149(3):308-318.



Volume 6 / Issue 2 / August 2026

Research Article

Periodontal Durum ile ABO ve Rh Kan Grubu Fenotipleri Arasındaki İlişki: Kesitsel Gözlemsel Bir Çalışma

Melis Ziyaettin^{1*}, Ayşe Ege Selman¹, Ülkü Tuğba Per¹, Burcu Karaduman¹

¹Biruni Üniversitesi, Diş Hekimliği Fakültesi, Periodontoloji Anabilim Dalı, İstanbul, Türkiye.

*Corresponding author: mziyaettin@biruni.edu.tr

Ziyaettin, Melis., Selman, Ayşe Ege., Per, Ülkü Tuğba., Karaduman, Burcu. "Periodontal Durum ile ABO ve Rh Kan Grubu Fenotipleri Arasındaki İlişki: Kesitsel Gözlemsel Bir Çalışma". *Acta Stomatologica Cappadocia*. 6;2 (August 2026): 44-60.

DOI: <https://doi.org/10.54995/ASC.6.2.4>

Received: 17.07.2026; Accepted: 01.09.2026

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



Periodontal Durum ile ABO ve Rh Kan Grubu Fenotipleri Arasındaki İlişki: Kesitsel Gözlemsel Bir Çalışma

Melis Ziyaettin, Ayşe Ege Selman, Ülkü Tuğba Per, Burcu Karaduman

Özet

Amaç: Bu çalışmanın amacı, Türk erişkin popülasyonunda periodontal durum ile ABO ve Rh kan grubu fenotipleri arasındaki olası ilişkinin değerlendirilmesidir.

Gereç ve Yöntem: Bu tek merkezli, kesitsel gözlemsel çalışmada elektronik hasta kayıtlarından elde edilen veriler kullanılarak sistemik olarak sağlıklı 163 birey değerlendirildi. Katılımcılar periodontal sağlıklı (n=50), gingivitis (n=49), Evre I-II periodontitis (n=25) ve Evre III-IV periodontitis (n=39) olmak üzere dört gruba ayrıldı. Periodontal tanılar, rutin klinik ve radyografik değerlendirmeler doğrultusunda 2017 Dünya Çalıştayı Periodontal ve Peri-implant Hastalıklar ve Durumlar Sınıflaması esas alınarak belirlendi. ABO ve Rh kan grubu bilgileri katılımcı anamnezlerinden elde edildi. Demografik özellikler ile ABO ve Rh kan grubu fenotiplerinin periodontal durumla ilişkisi uygun istatistiksel yöntemlerle analiz edildi ve anlamlılık düzeyi $p<0,05$ olarak kabul edildi.

Bulgular: Çalışmaya dahil edilen bireylerin %54,0'ı kadın, %46,0'ı erkekti. Periodontitis grubunun yaş ortalaması periodontal sağlıklı ve gingivitis grubuna göre anlamlı derecede daha yüksekti ($p<0,001$), ancak cinsiyet dağılımı gruplar arasında farklılık göstermedi ($p=0,143$). En sık görülen ABO kan grubu A (%36,2), en yaygın Rh fenotipi ise Rh pozitif (%89,6) olarak belirlendi. Periodontal durum ile ABO kan grubu dağılımı ($p=0,623$) ve Rh faktörü ($p=0,263$) arasında istatistiksel olarak anlamlı bir ilişki saptanmadı.

Sonuç: Bu çalışmanın sınırlılıkları dahilinde, periodontal durum ile ABO ve Rh kan grubu fenotipleri arasında anlamlı bir ilişki bulunmamıştır. Bulgular, periodontal hastalıkların multifaktöriyel doğasını desteklemekte olup, ABO ve Rh kan gruplarının periodontal hastalık gelişiminde tek başına belirleyici olmadığını düşündürmektedir. Bu ilişkinin daha kapsamlı olarak aydınlatılabilmesi için farklı popülasyonlarda, daha geniş örneklemli, çok merkezli ve prospektif çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: ABO kan grubu, gingivitis, periodontal hastalık, periodontitis, Rh faktörü.

Association Between Periodontal Status and ABO and Rh Blood Group Phenotypes: A Cross-Sectional Observational Study

Melis Ziyaettin, Ayşe Ege Selman, Ülkü Tuğba Per, Burcu Karaduman

Abstract

Objective: To evaluate the possible association between periodontal status and ABO and Rh blood group phenotypes in a Turkish adult population.

Materials and Methods: This single-center, cross-sectional observational study retrospectively analyzed data obtained from the electronic health records of 163 systemically healthy individuals. Participants were categorized into four groups: periodontal health (n=50), gingivitis (n=49), Stage I–II periodontitis (n=25), and Stage III–IV periodontitis (n=39). Periodontal diagnoses were established according to the 2017 World Workshop Classification of Periodontal and Peri-Implant Diseases and Conditions based on routine clinical and radiographic examinations. ABO and Rh blood group information was obtained from participants' medical records. Demographic characteristics and the associations between periodontal status and ABO and Rh blood group phenotypes were analyzed using appropriate statistical methods, with statistical significance set at $p<0.05$.

Results: Of the 163 participants, 54.0% were female and 46.0% were male. The mean age of the periodontitis group was significantly higher than that of the periodontal health and gingivitis group ($p<0.001$), whereas sex distribution did not differ significantly among the groups ($p=0.143$). Blood group A was the most prevalent ABO phenotype (36.2%), and Rh-positive was the predominant Rh phenotype (89.6%). No statistically significant association was observed between periodontal status and ABO blood group distribution ($p=0.623$) or Rh factor ($p=0.263$).

Conclusion: Within the limitations of this study, no significant association was found between periodontal status and ABO or Rh blood group phenotypes. The findings support the multifactorial nature of periodontal diseases and suggest that ABO and Rh blood group phenotypes are not independent determinants of periodontal disease development. Further large-scale, multicenter, prospective studies involving different populations are needed to better clarify this association.

Keywords: ABO blood group, gingivitis, periodontal disease, periodontitis, Rh factor.

Giriş

Periodontal hastalıklar, dental biyofilmin başlattığı ve konağın immün-inflamatuvar yanıtı ile şekillenen kronik inflamatuvar hastalıklardır. Gingivitis, inflamasyonun yalnızca diş eti dokularıyla sınırlı olduğu geri dönüşümlü bir tablo olarak kabul edilirken, inflamatuvar yanıtın kontrol altına alınamaması durumunda periodontal ligament ve alveoler kemikte geri dönüşümsüz yıkım meydana gelmekte ve periodontitis gelişmektedir (1,2). Günümüzde şiddetli periodontitis, dünya genelinde en yaygın kronik hastalıklardan biri olup erişkinlerde diş kaybının başlıca nedenleri arasında yer almaktadır. Ayrıca diyabet, kardiyovasküler hastalıklar, romatoid artrit ve kronik böbrek hastalığı gibi birçok sistemik hastalıkla çift yönlü ilişkisinin bulunması nedeniyle periodontitis yalnızca oral kaviteyi etkileyen lokal bir enfeksiyon olarak değil, genel sağlığı etkileyen önemli bir inflamatuvar hastalık olarak değerlendirilmektedir (2-4).

Mikrobiyal dental biyofilm periodontitisin temel etiyolojik faktörü olmakla birlikte, benzer miktarda biyofilm birikimine maruz kalan bireylerde periodontal yıkımın şiddetinin farklılık göstermesi, konak yanıtının ve bireysel duyarlılığı belirleyen faktörlerin hastalık gelişimindeki önemini ortaya koymaktadır. Bu nedenle günümüzde periodontitis; mikrobiyal etkenler ile konağa ait genetik, immünolojik, çevresel ve davranışsal faktörlerin karşılıklı etkileşimi sonucunda gelişen multifaktöriyel bir hastalık olarak kabul edilmektedir (2-4). Bu doğrultuda, periodontal hastalıklara yatkınlığı etkileyebilecek genetik ve fenotipik belirteçlerin tanımlanması, periodontal hastalıkların patogenezini anlamaya yönelik araştırmaların önemli odaklarından biri hâline gelmiştir (5).

ABO kan grubu sistemi, periodontal hastalıklarla ilişkisi en sık araştırılan konak kaynaklı biyolojik belirteçlerden biridir (5). ABO sistemi, eritrosit yüzeyinde bulunan A ve B karbonhidrat antijenlerinin varlığına göre bireyleri A, B, AB ve O olmak üzere dört temel fenotipe ayırmaktadır. Bununla birlikte ABO antijenleri yalnızca eritrositlerde değil; oral mukoza, tükürük bezleri, vasküler endotel ve çeşitli epitel dokularında da eksprese edilmektedir (5,6). Bu yaygın doku dağılımı nedeniyle ABO antijenlerinin konak-mikroorganizma etkileşimleri, hücresel adezyon, inflamatuvar mediyatörlerin düzenlenmesi ve konağın immün yanıtı üzerinde etkili olabileceği öne sürülmektedir (5,6). Ancak bu biyolojik mekanizmaların periodontal hastalıkların klinik görünümüne nasıl yansıdığı henüz net değildir.

ABO kan grubu sisteminin çeşitli inflamatuvar ve enfeksiyöz hastalıklarla ilişkili olduğunun gösterilmesi, periodontal hastalıklarla olası ilişkisine yönelik ilgiyi artırmıştır (5). Farklı popülasyonlarda yürütülen çalışmalarda A, B, AB veya O kan gruplarının periodontitis ile ilişkili olduğu bildirilmekle beraber, ilişkinin yönü ve büyüklüğü çalışmalar arasında değişkenlik göstermektedir (7-10). Buna karşın bazı araştırmalarda ABO kan grupları ile periodontal durum arasında anlamlı bir ilişki saptanmamıştır (10). Son yıllarda yayımlanan sistematik derleme ve meta-analizler de mevcut kanıtların heterojen olduğunu ve ABO kan grupları ile periodontal hastalıklar arasındaki ilişki konusunda kesin bir sonuca ulaşamadığını bildirmiştir (11).

Literatürdeki en güncel ve geniş örneklemli çalışmalardan biri olan Saito ve ark.'nın (12) Japon popülasyonunda gerçekleştirdiği kesitsel araştırmada, yaş, cinsiyet, beden kitle indeksi, diyabet ve sigara kullanımı gibi potansiyel karıştırıcı değişkenler kontrol edildikten sonra A ve AB kan gruplarına sahip erkeklerde şiddetli periodontitis görülme olasılığının daha yüksek olduğu bildirilmiştir. Aynı çalışmada A antijeninin varlığı ile şiddetli periodontitis arasında anlamlı bir ilişki gösterilmiş, ancak bu bulgular kadınlarda doğrulanmamıştır. Bu sonuçlar, ABO sistemi ile periodontitis arasındaki ilişkinin popülasyon özellikleri ve cinsiyete göre farklılık gösterebileceğini düşündürmektedir.

Mevcut çalışmaların yorumlanmasını güçleştiren önemli faktörlerden biri, araştırmalar arasındaki metodolojik farklılıklardır. Çalışmalar; örneklem özellikleri, periodontal tanı kriterleri ve istatistiksel analiz yaklaşımları bakımından önemli farklılıklar göstermektedir (7, 8, 10). Ayrıca önceki araştırmaların büyük bölümü eski periodontal hastalık sınıflamalarını temel almış, periodontal durum çoğunlukla sağlıklı, gingivitis ve periodontitis şeklinde geniş klinik kategoriler altında değerlendirilmiştir.

Önceki çalışmaların büyük bölümü, ABO ve Rh kan grubu fenotipleri ile periodontal hastalıklar arasındaki ilişkiye odaklanmıştır. Bununla birlikte, periodontal durumun 2017 Dünya Çalıştay sınıflaması doğrultusunda değerlendirildiği çalışmalar oldukça sınırlıdır (12). Benzer şekilde, Türk popülasyonunda ABO ve Rh kan grubu fenotipleri ile periodontal hastalıklar arasındaki ilişkiyi araştıran çalışma sayısı da azdır (9,13). Bu nedenle, bu çalışmanın amacı sistemik olarak sağlıklı Türk erişkinlerinde ABO ve Rh kan grubu fenotipleri ile A ve B antijenlerinin periodontal durumla ilişkisini 2017 Dünya Periodontal ve Peri-İmplant Hastalıklar ve Durumlar Sınıflaması doğrultusunda değerlendirmektir. Çalışmanın sıfır hipotezi,

periodontal durum ile ABO ve Rh kan grubu fenotipleri arasında anlamlı bir ilişkinin bulunmadığıdır.

Gereç ve Yöntem

Çalışma tasarımı ve etik onay

Bu tek merkezli, retrospektif kesitsel çalışma, Biruni Üniversitesi Diş Hekimliği Fakültesi Periodontoloji Anabilim Dalına başvuran bireylerin rutin periodontal değerlendirmeleri sırasında elde edilen klinik veriler kullanılarak gerçekleştirildi. Çalışma, Helsinki Bildirgesi'nin etik ilkelerine uygun olarak yürütüldü ve Biruni Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu tarafından onaylandı (Karar No: 2024-BİAEK/12-14). Çalışmaya dahil edilen bireylerden rutin klinik değerlendirmeler sırasında yazılı bilgilendirilmiş onamlar alınmıştır.

Örneklem büyüklüğü

Örneklem büyüklüğü, Ansari Moghadam ve ark. (10) tarafından bildirilen ABO kan grubu dağılımı ile periodontal hastalık prevalansına ilişkin veriler temel alınarak G*Power yazılımı (Version 3.1.9.4; Heinrich Heine University, Düsseldorf, Germany) kullanılarak a priori olarak hesaplandı. Pearson ki-kare testi için hesaplanan etki büyüklüğü Cohen'in $w=0,30$, serbestlik derecesi 3, anlamlılık düzeyi $\alpha=0,05$ ve test gücü %90 ($1-\beta=0,90$) kabul edildiğinde gerekli minimum örneklem büyüklüğü 158 birey olarak belirlendi. Bu doğrultuda çalışmaya dahil edilme kriterlerini karşılayan toplam 163 birey analize dahil edildi.

Çalışma popülasyonu

Çalışma popülasyonunu, Biruni Üniversitesi Diş Hekimliği Fakültesi Periodontoloji Anabilim Dalı'na 2020-2025 yılları arasında başvuran ve dahil edilme kriterlerini karşılayan bireyler oluşturdu.

Çalışmaya aşağıdaki kriterleri sağlayan bireyler dahil edildi:

- 18 yaş ve üzerinde olmak,
- En az 20 doğal daimi dişe sahip olmak,
- Sistemik olarak sağlıklı olmak,
- Son 6 ay içerisinde periodontal tedavi görmemiş olmak,
- Tıbbi anamnez formlarından doğrulanmış ABO ve Rh kan grubu kaydı bulunmak,
- Çalışmaya katılmaya gönüllü olmak.

Aşağıdaki özelliklerden herhangi birine sahip olan bireyler çalışma dışında bırakıldı:

- Gebelik veya emzirme,
- Son 3 ay içerisinde antibiyotik veya antiinflamatuvar ilaç kullanımı,
- Aktif ortodontik tedavi görüyor olmak,
- İmmünsüpresif ilaç kullanımı,
- Sistemik inflamatuvar hastalık öyküsü,
- Kooperasyonu etkileyebilecek bilişsel veya psikiyatrik bozukluk öyküsü.

Katılımcılar primer analiz için periodontal durumlarına göre iki gruba ayrıldı:

• Periodontal sağlıklı ve gingivitis: Periodontal sağlık; tüm dişlerde sondalama derinliğinin (SD) ≤ 3 mm olması, klinik ataşman kaybının (KAK) bulunmaması ve sondalamada kanama (SK) görülen bölgelerin $<10\%$ olması olarak tanımlandı. Gingivitis ise SD ≤ 3 mm, KAK bulunmaması ve SK görülen bölgelerin $\geq 10\%$ olması esas alınarak tanımlandı (1).

• Periodontitis tanısı ve evrelemesi, 2017 Dünya Periodontal ve Peri-İmplant Hastalıkları ve Durumlar Sınıflaması doğrultusunda klinik ve radyografik bulgular birlikte değerlendirilerek gerçekleştirildi (2,4). Primer analizde periodontitis olguları tek grup olarak değerlendirildi. İkincil analizlerde ise periodontitis grubu evreleme sonucuna göre Evre I-II ve Evre III-IV olarak alt gruplara ayrılarak analiz edildi.

Veri toplama ve periodontal değerlendirmeler

Çalışmada kullanılan demografik ve klinik veriler, Biruni Üniversitesi Diş Hekimliği Fakültesi Periodontoloji Anabilim Dalı'nda rutin hasta değerlendirmesi sırasında oluşturulan elektronik hasta kayıtlarından retrospektif olarak elde edildi. Katılımcılara ait yaş, cinsiyet, sigara kullanımı, sistemik sağlık durumu ile ABO ve Rh kan grubu bilgileri standart tıbbi anamnez formlarından kaydedildi. ABO kan grupları A, B, AB ve O, Rh faktörü ise pozitif veya negatif olarak sınıflandırıldı.

Katılımcıların periodontal tanıları, rutin klinik muayene kapsamında kaydedilen tüm ağız periodontal muayene bulguları ile panoramik radyografilerin birlikte değerlendirilmesi esas alınarak belirlendi. Rutin klinik değerlendirmeler kapsamında periodontal ölçümler UNC-15 periodontal sond (Hu-Friedy, Chicago, IL, ABD) kullanılarak gerçekleştirildi. Periodontal tanılar rutin klinik değerlendirmeler kapsamında tüm dişlerin/implanların altı bölge-

sinden (mesiobukkal, orta bukkal, distobukkal, mesiolingual, orta lingual ve distolingual) alınan plak indeksi (14), sondalama derinliği (SD), diş eti çekilmesi (DEÇ), klinik ataşman kaybı (KAK) ve sondalamada kanama (SK) klinik ölçümleri ile mevcut radyografik bulgular birlikte değerlendirilerek belirlendi. Katılımcılar, klinik ve radyografik bulgular doğrultusunda, 2017 Dünya Periodontal ve Peri-İmplant Hastalıklar ve Durumlar Sınıflaması esas alınarak periodontal sağlık, gingivitis, Evre I-II periodontitis ve Evre III-IV periodontitis gruplarına ayrıldı (2,4).

İstatistiksel Analiz

İstatistiksel analizler NCSS 2007 (Number Cruncher Statistical System, Kaysville, UT, USA) yazılımı kullanılarak gerçekleştirildi. Sürekli değişkenlerin normal dağılıma uygunluğu Shapiro-Wilk testi ile değerlendirildi. Tanımlayıcı istatistikler; normal dağılım gösteren sürekli değişkenler için ortalama±standart sapma, normal dağılım göstermeyen sürekli değişkenler için medyan (minimum-maksimum), kategorik değişkenler için ise sayı ve yüzde olarak sunuldu. Sürekli değişkenlerin gruplar arasındaki karşılaştırılmasında normal dağılım gösteren veriler için bağımsız örneklem t testi, normal dağılım göstermeyen veriler için Mann-Whitney U testi kullanıldı. Kategorik değişkenlerin karşılaştırılmasında Pearson Ki-kare testi uygulandı. Primer analizlerde periodontal sağlıklı ve gingivitis grubu ile periodontitis grubu karşılaştırıldı. İkincil analizlerde ise periodontitis olguları Evre I-II ve Evre III-IV olarak ayrıca değerlendirildi. Tüm analizlerde $p<0,05$ değeri istatistiksel olarak anlamlı kabul edildi.

Bulgular

Çalışmaya toplam 163 birey dahil edildi. Katılımcıların 88'i (%54,0) kadın, 75'i (%46,0) erkekti. Katılımcıların 99'u (%60,7) periodontal sağlıklı ve gingivitis grubunda, 64'ü (%39,3) ise periodontitis grubunda yer aldı (Tablo 1). Periodontitis olgularının 25'i (%39,1) Evre I-II, 39'u (%60,9) ise Evre III-IV olarak sınıflandırıldı.

Demografik özellikler açısından değerlendirildiğinde, yaş açısından periodontitis grubunun yaş ortalaması periodontal sağlıklı ve gingivitis grubuna göre anlamlı derecede daha yüksekti ($43,06\pm9,53$ yıl ve $29,79\pm9,41$ yıl; $p<0,001$). Cinsiyet dağılımı ise periodontal sağlıklı ve gingivitis grubu ile periodontitis grubu arasında istatistiksel olarak anlamlı farklılık göstermedi ($p=0,143$). (Tablo 1).

Çalışma popülasyonunda en sık görülen ABO kan grubu A (%36,2; n=59) olup, bunu sırasıyla O (%32,5; n=53), B (%20,2; n=33) ve AB (%11,0; n=18) kan grupları izledi. Katılımcıların 146'sı (%89,6) Rh pozitif, 17'si (%10,4) ise Rh negatifti (Tablo 2).

Tablo 1. Katılımcıların periodontal duruma göre demografik özellikleri

Değişken		Periodontal Sağlıklı ve Gingivitis (n=99)	Periodontitis (n=64)	p
Yaş (yıl)	Ort±SS	29,79±9,41	43,06±9,53	<0,001 [†]
	Min-Maks (Med-yan)	19-78 (27,0)	18-69 (43,0)	
Cinsiyet	Kadın n (%)	58 (58,6)	30 (46,9)	0,143 [‡]
	Erkek n (%)	41 (41,4)	34 (53,1)	

[†]Mann–Whitney U testi; [‡]Pearson Ki-kare testi. Ort±SS: Ortalama±standart sapma; Min–Maks: Minimum–maksimum; n: Birey sayısı; p<0,05. İstatistiksel olarak anlamlı bulunan p değerleri kalın yazı tipiyle gösterildi.

Tablo 2. Çalışma popülasyonunda ABO kan grubu fenotipleri ve Rh faktörünün dağılımı

Değişken		n	%
ABO kan grubu fenotipleri	A	59	36,2
	B	33	20,2
	AB	18	11,0
	O	53	32,5
Rh faktörü	Pozitif	146	89,6
	Negatif	17	10,4

n: Birey sayısı.

ABO kan grubu fenotiplerinin periodontal gruplara göre dağılımı değerlendirildiğinde, periodontal sağlıklı ve Evre III-IV periodontitis gruplarında A kan grubu, gingivitis ve Evre I-II periodontitis gruplarında ise O kan grubu en sık gözlenen fenotipti. Bununla birlikte, ABO kan grubu fenotiplerinin dağılımı periodontal gruplar arasında istatistiksel olarak anlamlı farklılık göstermedi (χ^2 , p=0,623) (Tablo 3).

Rh faktörü dağılımı incelendiğinde tüm periodontal gruplarda Rh pozitif fenotipinin baskın olduğu görüldü. Rh pozitiflik oranı periodontal sağlıklı grupta %94,0, gingivitis grubunda %87,8, Evre I-II periodontitis grubunda %80,0 ve Evre III-IV periodontitis grubunda %92,3 olarak belirlendi. Ancak Rh faktörü dağılımı periodontal gruplar arasında istatistiksel olarak anlamlı farklılık göstermedi ($p=0,263$) (Tablo 3).

Tablo 3. Periodontal duruma göre ABO kan grubu fenotipleri, Rh faktörü ile A ve B antijenlerinin dağılımı

Değişken		Periodontal sağlıklı (n=50)	Gingivitis (n=49)	Evre I-II periodontitis (n=25)	Evre III-IV periodontitis (n=39)	p [‡]
ABO kan grubu fenotipleri n (%)	A	21 (42,0)	15 (30,6)	6 (24,0)	17 (43,6)	0,623
	B	9 (18,0)	12 (24,5)	6 (24,0)	6 (15,4)	
	AB	3 (6,0)	5 (10,2)	5 (20,0)	5 (12,8)	
	O	17 (34,0)	17 (34,7)	8 (32,0)	11 (28,2)	
Rh faktörü n (%)	Pozitif	47 (94,0)	43 (87,8)	20 (80,0)	36 (92,3)	0,263
	Negatif	3 (6,0)	6 (12,2)	5 (20,0)	3 (7,7)	
A antijeni n (%)	Pozitif	24 (48,0)	20 (40,8)	11 (44,0)	22 (56,4)	0,523
	Negatif	26 (52,0)	29 (59,2)	14 (56,0)	17 (43,6)	
B antijeni n (%)	Pozitif	12 (24,0)	17 (34,7)	11 (44,0)	11 (28,2)	0,314
	Negatif	38 (76,0)	32 (65,3)	14 (56,0)	28 (71,8)	

[‡]Pearson Ki-kare testi. n: Birey sayısı; $p<0,05$. İstatistiksel olarak anlamlı bulunan p değerleri kalın yazı tipiyle gösterildi.

A ve B antijenlerinin periodontal durum ile ilişkisi değerlendirildiğinde, A antijeninin varlığı periodontal sağlıklı, gingivitis, Evre I-II periodontitis ve Evre III-IV periodontitis gruplarında sırasıyla %48,0, %40,8, %44,0 ve %56,4 olarak belirlendi. B antijeninin varlığı ise aynı gruplarda sırasıyla %24,0, %34,7, %44,0 ve %28,2 idi. Buna karşın, A antijeni ($p=0,523$) ve B antijeni dağılımları ($p=0,314$) bakımından periodontal gruplar arasında istatistiksel olarak anlamlı farklılık saptanmadı (Tablo 3).

Tartışma

Bu çalışmada, sistemik olarak sağlıklı Türk erişkinlerinde periodontal durum ile ABO ve Rh kan grubu fenotipleri arasındaki ilişki 2017 Dünya Periodontal ve Peri-İmplant Hastalıklar ve Durumlar Sınıflaması doğrultusunda değerlendirildi. Bulgularımız, ABO kan grubu fenotipleri, Rh faktörü ile A ve B antijenlerinin dağılımlarının periodontal sağlıklı, gingivitis, Evre I-II periodontitis ve Evre III-IV periodontitis grupları arasında istatistiksel olarak anlamlı farklılık göstermediğini ortaya koydu. Her ne kadar bazı ABO kan grubu fenotipleri belirli periodontal gruplarda sayısal olarak daha yüksek oranlarda gözlenmiş olsa da bu eğilimler istatistiksel anlamlılığa ulaşmadı. Bu bulgular, periodontal durum ile ABO ve Rh kan grubu fenotipleri arasında anlamlı bir ilişkinin bulunmadığı yönündeki sıfır hipotezini doğrulamaktadır. Ayrıca, ABO ve Rh kan grubu fenotiplerinin periodontal hastalık açısından bağımsız biyolojik belirteçler olarak değerlendirilmelerini destekleyen kanıt sağlamamaktadır.

Mevcut bulgular, Türkiye'de gerçekleştirilen önceki çalışmalarla kısmen benzerlik göstermektedir. Demir ve ark. (13), gingivitisli bireylerde A kan grubunun, periodontitisli bireylerde ise O kan grubunun daha yüksek oranda görüldüğünü bildirirken, Rh pozitifliğin yalnızca gingivitis ile ilişkili olduğunu, periodontitis ile ise anlamlı bir ilişki göstermediği bildirilmiştir. Benzer şekilde Bozorgi ve Otan Özden (9), ileri periodontitisli bireylerde O kan grubunun en yüksek, AB kan grubunun ise en düşük oranda görüldüğünü bildirerek, O kan grubunun periodontitise yatkınlık açısından olası bir rolü olabileceğini ileri sürmüştür. Buna karşın, mevcut çalışmada periodontal gruplar arasında ABO kan grubu fenotipleri ve Rh faktörünün dağılımı açısından istatistiksel olarak anlamlı bir farklılık saptanmamıştır. Çalışmalar arasındaki bu farklılık; örneklem büyüklüğü, araştırma popülasyonunun özellikleri, periodontal hastalığın sınıflandırılma yöntemi ve uygulanan istatistiksel analizlerdeki metodolojik farklılıklardan kaynaklanmış olabilir.

Türkiye'de bildirilen bulguların aksine, farklı popülasyonlarda yürütülen çalışmalarda ABO kan grubu fenotipleri ile periodontal hastalık arasındaki ilişkiye yönelik daha heterojen sonuçlar elde edilmiştir. Al-Askar ve ark. (15), mevcut çalışmamızla uyumlu olarak ABO kan grubu fenotipleri ile periodontal hastalık arasında anlamlı bir ilişki saptamamıştır. Buna karşılık Koregol ve ark. (16), Mostafa ve ark. (17) ve Vivek ve ark. (18), O kan grubuna sahip bireylerde periodontitisin daha sık görüldüğünü bildirirken; Pai ve ark. (19) A ve B kan gruplarının periodontitis ile daha güçlü ilişkili olabileceğini bildirmiştir. Öte yandan Pradhan ve ark. (20) ile Barros ve Witkop (21), ABO kan grupları ile periodontal hastalık arasında anlamlı bir ilişki bildirmemiştir. Birlikte değerlendirildiğinde, mevcut literatür belirli bir ABO kan grubu fenotipinin periodontal hastalık için evrensel bir risk göstergesi olduğunu ortaya koymamakta, farklı popülasyonlarda değişken sonuçlar bildirildiğini göstermektedir.

Çalışmalar arasında bildirilen sonuçlardaki farklılıklar, metodolojik yaklaşımlar ve araştırma popülasyonlarının özellikleriyle ilişkili olabilir. İncelenen araştırmalar arasında periodontal hastalığın tanımlanmasında kullanılan sınıflama sistemleri, tanı kriterleri ve dahil edilen periodontal hastalık grupları bakımından belirgin farklılıklar bulunmaktadır. Örneğin, Saito ve ark. (12) periodontal durumu Community Periodontal Index kullanarak değerlendirirken, Demir ve ark. (13) periodontal sağlıklı, gingivitis ve periodontitis gruplarını karşılaştırmış, Bozorgi ve Otan Özden (9) ise yalnızca ileri periodontitisli bireyleri periodontal sağlıklı kontrollerle karşılaştırmıştır. Buna karşılık mevcut çalışmada periodontal tanılar, 2017 Dünya Periodontal ve Peri-İmplant Hastalıklar ve Durumlar Sınıflaması doğrultusunda belirlenmiş ve olgular periodontal sağlıklı, gingivitis, Evre I-II periodontitis ve Evre III-IV periodontitis olmak üzere dört ayrı klinik grupta incelenmiştir. Ayrıca örneklem büyüklüğü, etnik yapı, yaş dağılımı ve olası karıştırıcı değişkenlerin kontrol edilme biçimindeki farklılıklar da çalışmalar arasında bildirilen sonuçlardaki değişkenliğe katkıda bulunmuş olabilir. Dolayısıyla, bulgularımız önceki çalışmalarla karşılaştırılırken bu metodolojik farklılıkların göz önünde bulundurulması gerekmektedir.

Bu çalışmanın özgün yönlerinden biri, ABO kan grubu fenotiplerine ek olarak A ve B antijenlerinin periodontal durum ile ilişkisinin de değerlendirilmiş olmasıdır. Analizler sonucunda A ve B antijenlerinin dağılımı periodontal gruplar arasında istatistiksel olarak anlamlı farklılık göstermemiştir. Her ne kadar A antijeni Evre III-IV periodontitis grubunda, B antijeni ise Evre I-II periodontitis grubunda sayısal olarak daha yüksek oranda gözlenmiş olsa da bu

farklılıklar istatistiksel anlamlılığa ulaşmamıştır. Literatürde ABO antijenlerinin periodontal hastalık ile ilişkisini doğrudan değerlendiren çalışma sayısı oldukça sınırlıdır. Yakın tarihli bir Japon çalışmasında Saito ve ark. (12), A antijeninin varlığının özellikle erkek bireylerde şiddetli periodontitis ile ilişkili olabileceğini bildirmiştir. Buna karşın mevcut çalışmada benzer bir ilişki gösterilememiştir. Bu farklılığın çalışma popülasyonlarının demografik özellikleri ve periodontal hastalığın sınıflandırılma yöntemlerindeki farklılıklardan kaynaklanabileceği düşünülmektedir. Mevcut bulgular, A ve B antijenlerinin periodontal hastalık açısından bağımsız bir biyobelirteç olarak kullanılmasını desteklememektedir.

Mevcut çalışmada Rh faktörü ile periodontal durum arasında istatistiksel olarak anlamlı bir ilişki saptanmamıştır. Bu bulgu, Bozorgi ve Otan Özden (9) tarafından bildirilen sonuçlarla uyumludur. Buna karşın Demir ve ark. (13), Rh pozitif bireylerde gingivitis ile anlamlı bir ilişki bildirmiş, ancak periodontitis açısından benzer bir ilişki göstermemiştir. Uluslararası literatürde de Rh faktörüne ilişkin bulgular tutarlı değildir. Rh sisteminin periodontal hastalık gelişimindeki olası rolünü açıklayan biyolojik mekanizmalar henüz net olarak ortaya konulamamış olup, mevcut bulgular Rh faktörünün periodontal hastalık açısından bağımsız bir risk göstergesi olduğunu desteklememektedir.

Mevcut çalışmanın önemli özelliklerinden biri, periodontal tanuların tam ağız klinik muayene ve radyografik değerlendirme birlikte kullanılarak 2017 Dünya Periodontal ve Perimplant Hastalıklar ve Durumlar Sınıflaması doğrultusunda belirlenmiş olmasıdır. Ayrıca periodontal sağlıklı, gingivitis, Evre I-II periodontitis ve Evre III-IV periodontitis olgularının ayrı klinik gruplar halinde değerlendirilmesi, ABO ve Rh kan grubu fenotiplerinin hastalığın farklı klinik evrelerindeki dağılımının ayrıntılı olarak incelenmesine olanak sağlamıştır. Bunun yanında, önceki çalışmaların büyük bölümünden farklı olarak yalnızca ABO kan grubu fenotipleri değil, A ve B antijenlerinin de değerlendirilmiş olması çalışmanın literatüre sağladığı özgün katkılar arasında yer almaktadır.

Çalışmada yer alan bulgular değerlendirilirken bazı sınırlılıkların göz önünde bulundurulması gerekmektedir. Araştırmanın tek merkezde yürütülmüş olması ve örneklem büyüklüğünün özellikle AB kan grubu ile Rh negatif bireylerde sınırlı kalması, alt grup analizlerinin istatistiksel gücünü azaltmış olabilir. Bunun yanı sıra çalışmanın kesitsel tasarımı nede-

niyle elde edilen bulgular nedensel bir ilişki ortaya koymamakta, yalnızca değişkenler arasındaki olası ilişkileri göstermektedir. Ayrıca, çalışmanın retrospektif tasarımı nedeniyle periodontal ölçümlerin rutin klinik değerlendirmeler sırasında birden fazla klinisyen tarafından gerçekleştirilmiş olması ve araştırmaya özgü gözlemci kalibrasyonunun bulunmaması, klinik ölçümlerde gözlemciler arası değişkenlik açısından bir sınırlılık oluşturabilir. Bu nedenle farklı popülasyonlarda, daha geniş örneklemlemlerle yürütülecek çok merkezli ve prospektif çalışmaların mevcut bulguların doğrulanmasına katkı sağlayacağı düşünülmektedir. Ayrıca ABO ve Rh kan grubu bilgilerinin öz bildirime dayalı anamnez kayıtlarından elde edilmiş olması çalışmanın bir diğer sınırlılığını oluşturmaktadır.

Sonuç

Bu çalışmada ABO ve Rh kan grubu fenotipleri ile periodontal durum arasında istatistiksel olarak anlamlı bir ilişki gösterilememiştir. Elde edilen bulgular, periodontal hastalığın multifaktöriyel etiyolojisi göz önünde bulundurulduğunda, ABO ve Rh kan grubu fenotiplerinin periodontal hastalık açısından bağımsız biyolojik belirteçler olarak kullanılmasını desteklememektedir. Bununla birlikte, standart periodontal tanı kriterlerinin kullanıldığı, farklı popülasyonları kapsayan geniş örneklemli prospektif çalışmalar, ABO ve Rh kan grubu sistemlerinin periodontal hastalığın patogeneziindeki olası rolünün daha kapsamlı biçimde değerlendirilmesine katkı sağlayacaktır.

Etik Kurul Onayı ve Katılım Onamı

Bu çalışma, Biruni Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu tarafından onaylanmıştır (2024-BİAEK/12-14). Çalışma Helsinki Bildirgesi ilkelerine uygun olarak yürütülmüştür. Araştırmada kullanılan veriler, rutin klinik uygulama kapsamında oluşturulan elektronik hasta kayıtlarından elde edilmiş olup, tüm hastalardan tedavi süreçleri ile bilimsel araştırmalarda verilerinin kullanılmasına yönelik yazılı bilgilendirilmiş onam alınmıştır.

Yayın Onamı

Uygulanamaz.

Veri Erişilebilirliği

Bu çalışmada kullanılan ve/veya analiz edilen veri setleri, makul talep doğrultusunda sorumlu yazardan temin edilebilir.

Çıkar Çatışması

Yazarlar herhangi bir çıkar çatışmasının bulunmadığını beyan etmektedir.

Finansman

Bu çalışma herhangi bir kamu kurumu, ticari kuruluş veya kâr amacı gütmeyen bir kuruluş tarafından finansal olarak desteklenmemiştir.

Yazar Katkıları

Burcu KARADUMAN çalışmanın fikrini geliştirmiş, çalışma tasarımına katkı sağlamış, çalışmanın yürütülmesini ve bilimsel sürecini danışman olarak denetlemiştir. Melis ZİYAET-TİN hasta kayıtlarından verileri toplamış ve düzenlemiş, bulguları yorumlamış, makalenin ilk taslağını hazırlamış ve yazım sürecini yürütmüştür. Ayşe Ege SELMAN çalışma tasarımına katkı sağlamış, istatistiksel analizleri gerçekleştirmiş ve sonuçların değerlendirilmesine katkıda bulunmuştur. Ülkü Tuğba PER hasta kayıtlarından verilerin toplanmasına katkı sağlamıştır. Tüm yazarlar makalenin son hâlini okumuş, gözden geçirmiş ve onaylamıştır.

Kaynakça

1. Chapple, I. L. C., Mealey, B. L., Van Dyke, T. E., Bartold, P. M., Dommisch, H., Eickholz, P., Geisinger, M. L., Genco, R. J., Glogauer, M., Goldstein, M., Griffin, T. J., Holmstrup, P., Johnson, G. K., Kapila, Y., Lang, N. P., Meyle, J., Murakami, S., Plemons, J., Romito, G. A., Shapira, L., ... Yoshie, H. (2018). Periodontal health and gingival diseases and conditions on an intact and a reduced periodontium: Consensus report of workgroup 1 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Periodontol, 89 Suppl 1, S74–S84. <https://doi.org/10.1002/JPER.17-0719>
2. Papapanou PN, Sanz M, Buduneli N, et al. Periodontitis: consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Clin Periodontol. 2018;45 Suppl 20:S162–S170. doi:10.1111/jcpe.12946.

3. Kinane DF, Stathopoulou PG, Papapanou PN. Periodontal diseases. *Nat Rev Dis Primers*. 2017;3:17038. Published 2017 Jun 22. doi:10.1038/nrdp.2017.38
4. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. *J Periodontol*. 2018; 89(Suppl 1): S159-S172. doi:10.1002/JPER.18-0006
5. Rehman GU. Association of ABO Blood Grouping and Periodontal Disease: A Literature Review. *Dent J Adv Stud*. 2021;9(3):116–120. doi:10.1055/s-0041-1736487.
6. Jain A, Devaraj G, Kuckreja H, Kuckreja KBS. Blood Groups: A Probable Link to Periodontal Diseases. *Dent J Adv Stud*. 2017;5:47-50. 10.1055/s-0038-1672080.
7. Gautam A, Mittal N, Singh TB, Srivastava R, Verma PK. Correlation of ABO Blood Group Phenotype and Rhesus Factor with Periodontal Disease: An Observational Study. *Contemp Clin Dent*. 2017;8(2):253-258. doi:10.4103/ccd.ccd_307_17
8. Chrysanthakopoulos NA. ABO blood group system and periodontal disease indices: a cross-sectional study in Greek adults. *Int J Clin Med Case Rep*. 2021;11(3):005. doi:10.46998/IJCMCR.2021.11.000265.
9. Bozorgi AM, Otan Özden F. İleri periodontitis ve ABO kan grupları arasındaki ilişki. *Türk Diş Hekimliği Araştırma Derg*. 2022;1(2):45–52.
10. Ansari Moghadam S, Rahnema A, Basiri M, Hashemi S. Association of ABO blood groups and Rh factor with periodontal disease prevalence in a population from Saravan, Iran. *Zahedan J Res Med Sci*. 2025. doi:10.5812/zjrms-158043.
11. Al-Askar M. Is there an association between periodontal diseases and ABO blood group? Systematic review and meta-analysis. *Quintessence Int*. 2022;53(5):404-412. doi:10.3290/j.qi.b2644845
12. Saito M, Shimazaki Y, Yoshii S, Kojima T. Association Between ABO Blood Type and Periodontitis: A Cross-Sectional Study. *Cureus*. 2025;17(4):e82266. Published 2025 Apr 14. doi:10.7759/cureus.82266
13. Demir T, Tezel A, Orbak R, Eltas A, Kara C, Kavrut F. The effect of ABO blood types on periodontal status. *Eur J Dent*. 2007;1(3):139–143. doi:10.1055/s-0039-1698329.
14. Silness J, Löe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. *Acta Odontol Scand*. 1964;22:121–135. doi:10.3109/00016356408993968.

15. Al-Askar M, AlMoharib HS, Alaqeely R, Talakey AA, Alzoman H, Alshihri A. The Relationship Between Periodontal Disease and ABO Blood Groups: A Cross-Sectional Study. *Oral Health Prev Dent.* 2021;19:295-299. Published 2021 Jun 1. doi:10.3290/j.ohpd.b1452963
16. Koregol AC, Raghavendra M, Nainegali S, Kalburgi N, Varma S. ABO blood groups and Rhesus factor: an exploring link to periodontal diseases. *Indian J Dent Res.* 2010;21(3):364-368. doi:10.4103/0970-9290.70804
17. Mostafa D, Elkhatat EI, Koppolu P, Mahgoub M, Dhaifullah E, Hassan AH. Correlation of ABO blood groups and Rh factor with the severity of generalized chronic periodontitis: a cross-sectional study in Riyadh, Saudi Arabia. *Open Access Maced J Med Sci.* 2019;7(4):617–622. doi:10.3889/oamjms.2019.044.
18. Vivek S, Jain J, Simon SP, Battur H, Supreetha S, Haridas R. Association of ABO blood group and Rh factor with periodontal disease in a population of Virajpet, Karnataka: a cross-sectional study. *J Int Oral Health.* 2013;5(4):30–34.
19. Pai GP, Dayakar MM, Shaila M, Dayakar A. Correlation between "ABO" blood group phenotypes and periodontal disease: Prevalence in south Kanara district, Karnataka state, India. *J Indian Soc Periodontol.* 2012;16(4):519-523. doi:10.4103/0972-124X.106892
20. Pradhan AC, Chawla TN, Samuel KC, Pradhan S. The relationship between periodontal disease and blood groups and secretor status. *J Periodontal Res.* 1971;6(4):294-300. doi:10.1111/j.1600-0765.1971.tb00620.x
21. Barros L, Witkop CJ Jr. Oral and genetic study of Chileans 1960. III. Periodontal disease and nutritional factors. *Arch Oral Biol.* 1963;8:195-206. doi:10.1016/0003-9969(63)90057-8.