ATATÜRK ÜNİVERSİTESİ YAYINLARI
ATATURK UNIVERSITY PUBLICATIONS

Research Article *Araştırma Makalesi* DOI: 10.17567/currresdentsci.1483348

Evaluation of Dentists' Diagnostic and Treatment Approaches to Dental Erosion Cases

Diş Hekimlerinin Dental Erozyon Vakalarına Teşhis ve Tedavi Yaklaşımlarının Değerlendirilmesi

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ABSTRACT

Objective: Studies on the etiology, prevalence, and management of dental erosion have increased in recent years. This study aimed to evaluate the experiences, awareness, diagnostic knowledge, and treatment preferences regarding dental erosion among dentists practicing in Turkey.
Methods: A total of 250 Turkish dentists participated in this cross-sectional study. Participants completed a 16-item questionnaire, including a case-based assessment. Data were analyzed using descriptive statistics and the Pearson Chi-square test (P<.05).
Results: The study included 173 female and 77 male dentists with a mean age of 32.48 ± 9.94 years. Most participants graduated between 2010 and 2019 (49.2%) and were general practitioners (62%). Dental erosion was reported most frequently in patients older than 35 years (64.4%) and in males (36%), primarily affecting the palatal/lingual surfaces of anterior teeth (28.5%). Most participants (84.4%) had received undergraduate education on dental erosion; however, only 6.8% reported using an index to assess lesion severity. Among index users, the Basic Erosive Wear Examination (BEWE) was the most commonly applied system (62.5%). In the case scenario, the most frequently recommended preventive measure was avoiding acidic beverages (25.5%), while composite resin restoration was the preferred treatment option (25%). Participants generally expressed confidence in diagnosing and managing dental erosion; however, deficiencies were identified in the assessment and grading of lesion severity.
Conclusion: Greater emphasis on the use of indexing and scoring systems for dental erosion is needed. Integrating these tools into undergraduate and postgraduate curricula and establishing clinical guidelines may improve the diagnosis and management of dental erosion.
Keywords: Basic Erosive Wear Examination, dental erosion, dentists, erosive tooth wear

ÖZ

Amaç: Dental erozyonun etiyolojisi, prevalansı ve yönetimine ilişkin çalışmalar son yıllarda artış göstermiştir. Bu çalışmanın amacı, Türkiye'de görev yapan diş hekimlerinin dental erozyona ilişkin deneyimlerini, farkındalık düzeylerini, tanısal bilgi birikimlerini ve tedavi tercihlerini değerlendirmektir.
Yöntemler: Bu kesitsel çalışmaya 250 Türk diş hekimi katılmıştır. Katılımcılar, bir olgu değerlendirmesini de içeren 16 soruluk bir anketi doldurmuştur. Elde edilen veriler tanımlayıcı istatistikler ve Pearson Ki-kare testi kullanılarak analiz edilmiştir (P<,05).
Bulgular: Çalışmaya yaş ortalaması 32,48 ± 9,94 olan 173 kadın ve 77 erkek diş hekimi katılmıştır. Katılımcıların çoğu 2010-2019 yılları arasında mezun olmuş (%49,2) ve pratisyen diş hekimidir (%62). Dental erozyonun en sık 35 yaş üzerindeki bireylerde (%64,4) ve erkek hastalarda (%36) görüldüğü, çoğunlukla anterior dişlerin palatinal/lingual yüzeylerini etkilediği (%28,5) bildirilmiştir. Katılımcıların %84,4'ü lisans eğitimi sırasında dental erozyon konusunda eğitim aldığını belirtmiş, ancak yalnızca %6,8'i lezyon şiddetini değerlendirmede bir indeks kullandığını ifade etmiştir. İndeks kullananlar arasında en yaygın sistem Temel Eroziv Aşınma Değerlendirmesi (BEWE) olmuştur (%62,5). Olgu senaryosunda en sık önerilen koruyucu yaklaşım asidik içeceklerden kaçınma (%25,5), en çok tercih edilen tedavi seçeneği ise kompozit rezin restorasyon (%25) olarak belirlenmiştir. Katılımcılar dental erozyonun tanı ve tedavisinde kendilerine güvendiklerini belirtmekle birlikte, lezyon şiddetinin değerlendirilmesi ve derecelendirilmesi konusunda eksiklikler olduğu görülmüştür.
Sonuç: Dental erozyonda indeksleme ve skorlama sistemlerinin kullanımına daha fazla önem verilmesi gerekmektedir. Bu sistemlerin lisans ve lisansüstü eğitim programlarına entegre edilmesi ve standart klinik kılavuzların oluşturulması, dental erozyonun tanı ve yönetimini geliştirebilir.
Anahtar Kelimeler: Temel Eroziv Aşınma Değerlendirmesi, dental erozyon, diş hekimleri, eroziv diş aşınması

Geliş Tarihi/Received 21.05.2024
Revizyon Talebi/Revision Requested 07.03.2025
Son Revizyon/Last Revision 22.03.2025
Kabul Tarihi/Accepted 26.03.2025
Yayın Tarihi/Publication Date 21.07.2026

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Cite this article: Haberal M, Uyduran M, Adışen MZ, Çelik Ç. Evaluation of Dentists' Diagnostic and Treatment Approaches to Dental Erosion Cases. *Curr Res Dent Sci.*2026; 36(3):224-229. DOI: 10.17567/currresdentsci.1483348

INTRODUCTION

Nowadays, the incidence of dental erosion is gradually increasing in societies.[1-3] Accordingly, a good understanding of the diagnosis and treatment of dental erosion lesions has become important for both patients and dentists. It is very difficult for dentists to make the best treatment decision both in the short and long-term in cases of dental erosion, which are usually encountered in young patients. It is known that it is important to identify people at risk and to evaluate potential factors well. In most cases, a comprehensive evaluation of the patient's general health status, habits, salivary flow rate, buffering capacity, and dietary analysis is required. In this group of patients, the time to consult a dentist is often when the erosion lesions are advanced enough to require restorative treatment.[4] Given this situation, early detection of dental erosion is very important.[5]

Although there is currently no standardized treatment that can be recommended for teeth with erosion lesions, a minimally invasive approach is recommended.[6] The first step in erosion treatment should be to define the etiology of erosion and eliminate the factor. As a result of these evaluations; a patient-specific preventive program should be determined.[4] In many patients, preventive measures such as changing the diet and topical fluoride applications provide control over erosion. A study by Lussi and Schaffner[7] showed that active erosion lesions will progress over time if adequate preventive measures are not applied.

Studies on the etiology, incidence, and treatment options of dental erosion have recently increased in the dental literature.[8-10] Studies show that dentists provide inadequate information about dental erosion to patients in possible risk groups.[11,12] In a study conducted in Norway, it has been shown that dentists have relatively up-to-date information on the clinical diagnosis and treatment of dental erosion, however, the necessary preventive treatments in the early period are under-applied.[13] In another recent study, Icelandic dentists were found to be aware of the minimally invasive treatment approach for patients with dental erosion; however, it was reported that it was difficult for dentists to make the best treatment decision due to the lack of a standardized treatment procedure.[14] A study on the diagnostic and treatment approaches of dentists in Turkey to dental erosion cases was not found in the literature.

The aim of the study was to investigate the dental erosion experiences, awareness, diagnostic knowledge and treatment choices of a group of dentists practicing in Turkey. The aim was to raise awareness about the increasing incidence of dental erosion in Turkey[15,16], as in the rest of the world[9,13,14], and the importance of early diagnosis.[17,18] The null hypothesis of the study was that dentists have low awareness of diagnosing and treating dental erosion cases.

METHODS

The ethics committee's approval of this study was obtained from the Kırıkkale University Non-Interventional Research Ethics Committee on January 7, 2021, at its meeting numbered 2021/01 with the decision number 2021.01.01. For the study, a 16-question evaluation form[17-20] covering diagnosis and treatment approaches to dental erosion cases was prepared using Google Forms (Google, California, USA). The prepared questions were sent electronically to dentists working in private practices, universities, public hospitals, and other units who volunteered to fill out the form. An introductory letter was sent to the participants stating the purpose of the study and containing a privacy statement to protect the participants' personal data, and their informed consent was obtained.

The first 5 questions in the evaluation form were individual questions about age, gender, professional experience, specialty, and institution of employment. The next 9 questions were asked to assess clinical experience and diagnostic knowledge about dental erosion. This section included questions about how the physicians recorded erosive lesions on teeth, their distribution in patient groups and their estimates of their prevalence. The last part of the form included a case report with clinical photographs (Figure 1).

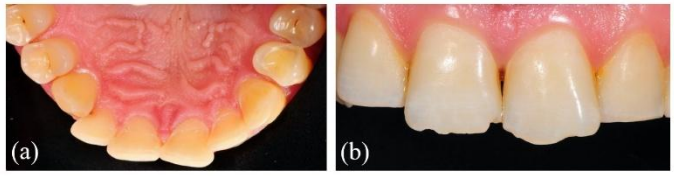

Figure 1. Clinical appearance of a case of dental erosion: (a) palatal and incisal surfaces of maxillary incisors, (b) labial surfaces of maxillary incisors

"A Case of Dental Erosion: A 20-year-old female patient presented with complaints of sensitivity and erosion in her teeth. In her medical history, it was learned that she had complaints of a bitter taste in her mouth, burning in her stomach, and reflux attacks. The patient's dietary habits included frequent consumption of acidic drinks and citrus fruits. Dental examination revealed widespread sensitivity to cold stimuli. The palatal surfaces and incisal edges of teeth 11 and 21 showed erosion lesions of different severity. No erosive lesions were detected on the molars. Although the image suggests erosion on the palatal surfaces of teeth 12 and 13 and the occlusal surface of tooth 14, no clinical symptoms of erosion were detected in these teeth."

In the following 2 questions, the physician's recommendations for the prevention of dental erosion and treatment preferences were determined.

Statistical evaluations in this study were performed using the IBM SPSS 22 (IBM SPSS Corp., Armonk, NY, USA) package program. The data obtained were analyzed using descriptive statistics and the Pearson Chi-Square test. The statistical significance level was determined as $P<.05$..

RESULTS

The distribution of the number and percentages of the volunteer dentists' responses to the evaluation questions is shown in Table 1 and Table 2.

Table 1. Demographic data of the study population

	Number	(%)
Gender		
Female	173	69
Male	77	31
Graduation Date		
Before 2010	75	30
2010-2019	123	49.2
After 2019	52	20.8
Specialization Status		
Non-specialist	155	62
Specialist	95	38
Specialty		
Oral and Maxillofacial Surgery	6	6.3
Oral and Maxillofacial Radiology	2	2.1
Endodontics	11	11.6
Orthodontics	4	4.2
Pedodontics	9	9.5
Periodontology	12	12.6
Prosthodontics	21	22.1
Restorative Dentistry	30	31.6
Institution of Assignment		
Private Dental Clinic	86	34.4
University Hospital	68	27.2
Public Hospital	65	26
Others	31	12.4

Table 2. Distribution of responses to survey questions

Questions	Number	(%)
1. How often do you diagnose erosion when examining your patients?		
Never	2	0.8
Rarely	92	36.8
Sometimes	108	43.2
Frequently	48	19.2
2. In which age group do you most commonly see dental erosion?		
0-12	8	3.2
12-18	9	3.6
18-35	72	28.8
Over 35 years old	161	64.4
3. In which gender do you think dental erosion is more common?		
Female	57	22.8
Male	90	36.0
Equal rates in both genders	42	16.8
I have no idea about this	61	24.4
4. In which area of the mouth do you most commonly see erosion lesions? (You can choose more than one)		
Palatal/lingual surfaces of anterior teeth	123	28.5
Labial surfaces of anterior teeth	98	22.7
Occlusal surfaces of premolar/molar teeth	97	22.5
Palatal/lingual surfaces of premolar/molar teeth	39	9
Buccal surfaces of premolar/molar teeth	74	17.2
5. Do you have difficulty distinguishing cases of erosion from other cases of tooth wear?		
Yes	91	36.4
No	159	63.6
6. Did you receive training on tooth erosion during your undergraduate education?		
Yes	211	84.4
No	39	15.6
7. Do you use any index or scoring system to rate the severity of tooth erosion?		
Yes	17	6.8
No	233	93.2
8. (If yes to question 7) Which index or scoring systems do you use to rate the severity of tooth erosion? (You can choose more than one)		
Eccles and Jenkins Tooth Erosion Index	2	8.3
TWI (Tooth Wear Index)	5	20.8
Modified Lussi Tooth Erosion Index	2	8.3
BEWE (Basic Erosive Wear Examination) Index	15	62.5
9. (If yes to question 7) How did you become familiar with the index or scoring systems used to rate the severity of tooth erosion? (You can choose more than one)		
During undergraduate education	8	20
During specialty education	11	27.5
Scientific events such as congresses, seminars, symposiums	5	12.5
Written literature and books	11	27.5
Electronic databases	5	12.5

A total of 250 people (69% female, 31% male) with a mean age of 32.48 ± 9.94 years participated in the study.

The majority of the dentists who participated in the study graduated between 2010 and 2019 (49.2%). Dentists who did not receive specialty training in any field participated in the study more than dentists who received specialty training (62%). According to the areas of specialization, it is observed that the highest number of dentists, 31.6%, are specialists in restorative dentistry. Dentists working in private practice had the highest participation rate in the survey study at 34.4%, compared to those working in other institutions.

Among the participating volunteer dentists, 43.2% reported that they sometimes diagnosed dental erosion during examination, while 36.8% reported that they rarely diagnosed it. 64.4% of the respondents selected the option that they most frequently encountered dental erosion in patients aged 35 years and older. 36% of the participants stated that dental erosion was most common in male patients. This answer was followed by those who had no opinion on this subject with 24.4%, those who preferred the option of female patients with 22.8% and those who said that they saw it equally in both sexes with 16.8%.

Among the participating volunteer dentists, 28.5% reported detecting erosive lesions on the palatal/lingual surfaces of anterior teeth, 22.7% on the labial surfaces of anterior teeth, 22.5% on the occlusal surfaces of premolars/molars, 17.2% on the buccal surfaces of premolars/molars, and 9.0% on the palatal/lingual surfaces of premolars/molars.

63.6% of the volunteer dentists said that they had no difficulty distinguishing erosion cases from other cases of tooth wear. Out of the 250 volunteer dentists, 211 (84.4%) reported having received training on dental erosion during their undergraduate education. It was observed that the level of education on dental erosion among dentists who received undergraduate education after 2019 was significantly higher than those who received education in previous years (P=.009).

93.2% of the volunteer dentists said that they did not use any index or scoring system to assess the severity of dental erosion. According to the responses of the volunteer dentists who used an index or scoring system, the most commonly used system was the BEWE (Basic Erosive Wear Evaluation) index (62.5%), followed by TWI (Tooth Wear Index) with 20.8%. Volunteer dentists who used an index or scoring system stated that they accessed this information 20% during undergraduate education, 27.5% during specialty education, 12.5% in scientific activities such as congresses, seminars, and symposiums, 27.5% from written sources and books, 12.5% from electronic sources. The level of knowledge about the indices or scoring systems used to rate the severity of dental erosion was significantly higher during specialty training (P<.001), while the level of knowledge obtained from events such as congresses, seminars, symposiums and electronic sources was also statistically significant (P=.004). Dentists working in university hospitals were the group that obtained significantly more information both during specialty training and from scientific activities such as congresses, seminars and symposiums (P=.004, P=.003).

Table 3 shows the answers of the participating dentists to the questions regarding the case presented in Figure 1.

Table 3. Distribution of responses to case questions

Questions	Number	(%)
1. What suggestion(s) would you give to the patient in the case presented? (You can choose more than one)		
I don't make any suggestions.	0	0
I recommend avoiding acidic drinks.	202	25.5
I make suggestions about brushing technique / habits.	128	16.2
I recommend a special toothpaste for patients with tooth erosion.	113	14.3
I recommend using agents that provide remineralization.	154	19.5
I will refer you to a medical doctor.	148	18.7
I refer to a specialist, faculty hospital or other dentist.	46	5.8
2. Which treatment option(s) would you prefer for teeth 11 and 21? (You can choose more than one)		
I do not administer treatment.	11	1.8
I apply a topical fluoride agent.	117	19
I apply remineralizing agent(s).	147	23.8
I apply bonding agent.	88	14.3
I restore it with glass ionomer materials.	22	3.6
I restore it with composite resin.	154	25
I restore it with ceramic laminate veneer.	39	6.3
I restore with a crown.	39	6.3

In the case presented, it was observed that dentists advised the patient to avoid acidic beverages at the highest rate (25.5%), and also not to use toothpaste containing abrasive and remineralizing agents.

18.7% of the participants selected the option 'I would refer to a medical doctor'. Specialized dentists were significantly more likely to refer patients to a medical doctor than non-specialized dentists (*P*=.020). It was observed that dentists working in private practice preferred to refer the patient to a specialist, faculty hospital or another dentist significantly more than dentists working in other institutions (*P*=.041).

In the case shown in Figure 1, the most preferred treatment for teeth 11 and 21 was composite resin restoration with a rate of 25%, followed by the remineralizing agent with 23.8%. The least preferred treatment by dentists was no treatment. The rate of bonding agent application in the treatment of specialist dentists was significantly higher than that of non-specialists (*P*=.021). Dentists who graduated between 2010 and 2019 preferred restoration with glass ionomer materials as a treatment option significantly more than other years (*P*=.019). However, it was observed that the option 'I restore with glass ionomer materials' was significantly less preferred by dentists working in private practice and public hospitals compared to dentists working in university hospitals (*P*=.011).

DISCUSSION

Although the incidence of dental erosion cases in the community is increasing, there are not enough studies on this subject. The present study aimed to evaluate the dental erosion experience, awareness, training, and choice of treatment options of dentists working in Turkey. Based on the findings, the hypothesis that dentists are inadequate in diagnosing and treating dental erosion cases and have low awareness of this issue was rejected.

The dentists who participated in the study reported that their patients with dental erosion were mostly males. Many studies support this finding.[21-24] The reason for this may be that males consume acidic beverages more than females.[25] In another study aiming to investigate whether genetic markers in genes involved in enamel formation are associated with enamel erosion, it was revealed that there was a significant correlation between the variation in genes involved in enamel formation and lower susceptibility to tooth wear among female volunteer dentists and it was concluded that the susceptibility to tooth wear in males may be genetic.[26]

According to the answers given by the dentists participating in the study, when the distribution of dental erosion lesions in the mouth was analyzed, it was seen that the most common lesions were on the palatal and lingual surfaces of the anterior teeth. The labial surfaces of anterior teeth and the occlusal surfaces of premolars/molars were also relatively affected. This is consistent with many studies.[3,13,27] Mulic et al.[13] aimed to investigate the general experience and knowledge of Norwegian dentists regarding the diagnosis and treatment of dental erosive wear in young adults. According to the answers given in the study, lesions were most commonly reported on the palatal surfaces of the upper anterior teeth, occlusal surfaces of the lower 1st molars, and upper 1st molar. A study by Hasselkvist et al.[3] investigated the prevalence of dental erosion among Swedish children and adolescents. They also examined its association with soft drink consumption. The study found that the highest scores for the palatal surfaces of the maxillary central incisors, as well as the pitting scores for teeth 36/46, were highly effective in predicting severe or very severe dental erosion. These measures showed a sensitivity of 100% and a specificity of 98%. This was in comparison to grading all the buccal and palatal surfaces of the teeth.

It is important to use a grading index or scoring system to record the presence and progression of dental erosion in the clinical setting.[28] The majority of the dentists who participated in this study did not use any index or scoring system. This may be due to their own preference or lack of knowledge. Both situations cause negative results in terms of diagnosing dental erosion and monitoring its progression. A study conducted in Yemen found similar results, while a study conducted in Norway found the opposite.[13,29] Al-Ashtal et al.[29] conducted a study investigating Yemeni dentists' and dental students' knowledge of associated factors, diagnostic approaches, and methods to prevent dental erosion, as well as the associations between dental erosion awareness and some potentially relevant variables. Dentists and dental students recognize smoothing of enamel surfaces as an early clinical sign of dental erosion, with a preference for using an index to rate severity observed among dentists and dental students. However, the majority of dentists and students relied on general signs of dental erosion without resorting to an index at the clinical diagnosis stage. In the study by Mulic et al.[13], the majority of dentists reported using a specific scoring system recorded at the tooth surface level. In most cases, this was the recording system included in the electronic patient diary system. About a quarter of dentists recorded erosions only at the patient level, which does not allow for specific tracking of lesion progression.

The experience and specialization of dentists play a crucial role in diagnosing and managing dental erosion. Dentists with advanced training in restorative dentistry or oral medicine are better at identifying early signs of erosion and using grading systems effectively. Experienced practitioners can distinguish subtle enamel changes from other lesions, leading to more accurate diagnoses and timely treatments. The use of scoring systems varies among dentists, reflecting differences in their training and exposure to erosion cases.[30] In the present study, it was found that most dentists did not use any index or scoring system, though those with specialized training showed significantly better knowledge. In addition, restorative dentistry specialists had higher participation rates, emphasizing the value of specialized education. Dentists working in university hospitals gained more knowledge through specialty training and scientific activities. These findings highlight the importance of structured training programs and standardized scoring systems like BEWE and TWI to improve diagnostic accuracy and treatment outcomes.

Gastroesophageal reflux disease and consumption of acidic foods are among the most important risk factors in the formation of dental erosion lesions.[31,32] It was found that the risk of developing dental erosion lesions was 37 times higher in people who consumed more fruits, especially citrus fruits than in people who consumed less fruit.[33] Turkish dentists who participated in the survey preferred to advise patients with dental erosion to avoid consuming acidic beverages the most. This may be interpreted as a high level of awareness among Turkish dentists about the factors causing erosion.

The least preferred method for the treatment of the patient in the case example presented by the dentists participating in the survey was to send the patient to specialists, faculty hospitals, or another dentist. They mostly preferred to find a solution to the patient's complaint themselves and preferred medical doctors if they were to refer the patient. This may suggest that the participants have sufficient knowledge and confidence in dental erosion treatment approaches. Our findings are similar to those of a study conducted in Norway.[13] The reason why dentists prefer to refer patients to medical doctors may be that they know that gastroesophageal reflux is among the important risk factors in the development of dental erosion and they think that the evaluation of the patients by a specialist medical doctor is good for the course of treatment.

In the treatment of the presented case, composite resin restoration is the most preferred method by dentists, followed by remineralizing agents, topical fluoride, and bonding agent applications. However, more aggressive treatment options such as restoration with ceramic lamina and crowns are also among the preferred treatments, albeit to a lesser extent. This may be related to the difference in treatment options according to the severity of erosion cases.

Dentists who graduated between 2010 and 2019 showed a significantly higher preference for the use of glass ionomer materials in restorative treatments compared to their counterparts from other graduation years. This shift can be explained by the prominence of minimally invasive techniques incorporated into the educational curricula during this period, alongside the increased recognition of the advantages of glass ionomer cements, including their ability to chemically bond to dental tissue, biocompatibility, and fluoride-releasing properties.[34,35] Furthermore, the advent of advanced formulations of glass ionomer cements, along with their ease of application and cost-effectiveness, likely contributed to the material's growing popularity among newly graduated practitioners.[36] These factors have made glass ionomer restorations a widely favored option in restorative dentistry, combining practical applicability in clinical settings with economic viability for both practitioners and patients.

Studies have shown that conventional fluorides have an anti-erosive effect.[37,38] Furthermore, stannous fluoride-containing formulations have been reported to provide additional protection against dental erosion.[37,38] In the present study, the dentists who participated in the survey preferred topical fluoride application as the third treatment method, with a rate of 19% in the case questions.

Nowadays, contemporary adhesive composite materials are considered suitable for the restorative management of erosive tooth wear, as supported by clinical evidence and consensus recommendations.[39,40] Dentists who recommend more invasive treatments may not have sufficient knowledge about the grading and treatment of dental erosion.

The limitations of this study include the fact that the evaluation form was sent to only one group of dentists working in Turkey. The study population does not reflect all Turkish dentists. Other limitations include not investigating the effect of saliva on dental erosion by analyzing saliva tests, not taking into account the aesthetic or functional needs or financial status of the patient in the clinical case presented, and not examining dietary habits on erosion in detail.

CONCLUSION

Within the limitations of the present study, it was concluded that the participating dentists were knowledgeable about dental erosion. They were confident about the diagnosis and treatment of erosion lesions. It was observed that they generally preferred to utilize non-invasive options as a treatment method. However, it was observed that there is a need for more awareness and training regarding the use of an index or scoring system for grading the severity of dental erosion lesions. Consequently, it is suggested that dental schools incorporate training on indexing and scoring systems for dental erosion into their undergraduate curricula, while postgraduate programs should offer specialized courses with practical workshops and case discussions. Additionally, promoting the widespread use of these systems, creating standardized clinical guidelines, and developing clinical protocols can improve consistency in diagnosis and enhance treatment outcomes.

Ethics Committee Approval: Ethics committee approval was obtained from Kırıkkale University Non-Interventional Research Ethics Committee (Meeting Date: January 7, 2021, Meeting Number: 2021/01, Decision No: 2021.01.01).
Informed Consent: Informed consent was obtained from all participants in the study.
Peer-review: Externally peer-reviewed.
Author Contributions: Concept - M.H., M.Z.A., Ç.Ç.; Design - M.H., M.U., M.Z.A., Ç.Ç.; Supervision - Ç.Ç.; Resources - M.H., M.U.; Materials - M.H., M.U.; Data Collection and/or Processing - M.H., M.U., M.Z.A., Ç.Ç.; Analysis and/or Interpretation - M.H., M.U., M.Z.A., Ç.Ç.; Literature Search - M.H., M.U., M.Z.A., Ç.Ç.; Writing Manuscript - M.H., M.U., M.Z.A., Ç.Ç.; Critical Review - Ç.Ç.
Conflict of Interest: The authors have no conflicts of interest to declare.
Financial Disclosure: The authors declared that this study has received no financial support.
Use of Artificial Intelligence: The authors state that no artificial intelligence model was used in this study.

Etik Komite Onayı: Etik Kurul Onayı Kırıkkale Üniversitesi Girişimsel Olmayan Araştırmalar Etik Kurulu'ndan (Toplantı Tarihi: 07.01.2021, Toplantı Sayısı: 2021/01, Karar No: 2021.01.01) alınmıştır.
Hasta Onamı: Çalışmaya katılan tüm katılımcılardan onam alınmıştır.
Hakem Değerlendirmesi: Dış bağımsız.
Yazar Katkıları: Fikir - M.H., M.Z.A., Ç.Ç.; Tasarım - M.H., M.U., M.Z.A., Ç.Ç.; Denetim - Ç.Ç.; Kaynaklar - M.H., M.U.; Malzemeler - M.H., M.U.; Veri Toplama ve/veya İşleme - M.H., M.U., M.Z.A., Ç.Ç.; Analiz ve/veya Yorum - M.H., M.U., M.Z.A., Ç.Ç.; Literatür Taraması - M.H., M.U., M.Z.A., Ç.Ç. ; Yazma - M.H., M.U., M.Z.A., Ç.Ç.; Eleştirel İnceleme - Ç.Ç.
Çıkar Çatışması: Yazarlar, çıkar çatışması olmadığını beyan etmiştir.
Finansal Destek: Yazarlar, bu çalışma için finansal destek almadığını beyan etmiştir.
Yapay Zeka Kullanımı: Yazarlar bu çalışmada herhangi bir yapay zekâ modelinin kullanılmadığını beyan etmiştir.

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