

EVALUATION OF PERIODONTAL HEALTH IN CHILDREN UNDERGOING INTERCEPTIVE ORTHODONTIC TREATMENT: A TIME-BASED BPE ANALYSIS AND THE ROLE OF ORAL HYGIENE EDUCATION

ЕВАЛУАЦИЈА НА ПАРОДОНТАЛНОТО ЗДРАВЈЕ КАЈ ДЕЦА СО ИНТЕРЦЕПТИВЕН ОРТОДОНТСКИ ТРЕТМАН: ВРЕМЕНСКА АНАЛИЗА ПРЕКУ БПЕ И УЛОГАТА НА ЕДУКАЦИЈАТА ЗА ОРАЛНА ХИГИЕНА

Çitaku E.¹, Çitaku E.^{2*}, Minovska A.¹, Rendjova V.²

¹Faculty of Medical Sciences, Goce Delcev University, Štip, North Macedonia, ²Faculty of Dentistry, Ss. Cyril and Methodius University, Skopje, North Macedonia, *Corresponding Author

Abstract

Background: Interceptive orthodontics plays an essential role in early dental care by guiding the normal growth of the jaws and preventing the development of more severe malocclusions later in life. However, the presence of orthodontic appliances often complicates daily oral hygiene practices for children, increasing the risk of plaque accumulation and gingival inflammation. The Basic Periodontal Examination (BPE) provides a quick and minimally invasive approach for monitoring periodontal health, however, its application in pediatric patients undergoing interceptive orthodontic treatment has not been sufficiently investigated. **Methods:** This prospective observational study included 30 children (17 girls and 13 boys) aged 7–11 years, all undergoing interceptive orthodontic treatment with removable acrylic appliances for the correction of dental crowding. Periodontal status was assessed using the Basic Periodontal Examination (BPE) index at five time points: before appliance insertion (T₀), and after 3 (T₁), 6 (T₂), 9 (T₃), and 12 months (T₄). All examinations were performed by a single calibrated examiner (Cohen's $\kappa = 0.87$) to ensure measurement reliability. At each visit, children and their parents received personalized oral hygiene instructions with an emphasis on effective toothbrushing around the appliance. Statistical analysis was conducted using the Friedman test and posthoc Wilcoxon signed-rank tests with Bonferroni correction ($\alpha=0.05$). **Results:** Significant differences in Basic Periodontal Examination (BPE) scores were observed across the 12-month observation period ($\chi^2=17.42$, $df=4$, $p=0.002$). The scores increased during the first three months (T₀ → T₁, $p=0.018$), reflecting a transient rise in gingival inflammation following appliance placement. Thereafter, a progressive improvement was observed, with scores decreasing at subsequent evaluations (T₁ → T₃, $p=0.021$; T₁ → T₄, $p=0.008$). By the end of the study, no significant difference was noted between baseline and final values (T₀ → T₄, $p>0.05$), indicating recovery and stabilization of periodontal health associated with consistent follow-up and parental support. **Conclusion:** The Basic Periodontal Examination (BPE) proved to be a practical, reliable, and child-appropriate tool for monitoring periodontal health during interceptive orthodontic treatment. Although a short-term increase in gingival inflammation occurred after appliance placement, regular follow-up visits, reinforced oral hygiene instructions, and active parental involvement contributed to significant improvement in periodontal status. These findings highlight the importance of incorporating routine periodontal assessment and continuous hygiene education into all stages of early orthodontic care. **Keywords:** Interceptive orthodontics; Basic Periodontal Examination; Pediatric dentistry; Periodontal health; Oral hygiene; Removable appliances.

Апстракт

Позадина: Интерцептивната ортодонција претставува суштински дел од раната стоматолошка заштита, бидејќи овозможува насочување на нормалниот раст на вилиците и спречување на развојот на потешки малоклузии во подоцнежниот период од животот. Сепак, присуството на ортодонтски апарати често ја отежнува секојдневната орална хигиена кај децата, што го зголемува ризикот од наталожување на плак и појава на гингивална инфламација. Основниот пародонтален преглед (BPE) претставува брза и минимално инвазивен метод за следење на пародонталното здравје, но неговата примена кај деца кои се подложени на интерцептивен ортодонтски третман сè уште не е доволно истражена. **Методи:** Во оваа проспективна опсервациска студија беа вклучени 30 деца (17 девојчиња и 13 момчиња) на возраст од 7 до 11 години, сите со извршен интерцептивен ортодонтски третман со мобилни акрилни апарати поради забна тескоба. Пародонталниот статус беше проценет со помош на индексот BPE во пет временски точки: пред поставување на апаратот (T₀), по 3 (T₁), 6 (T₂), 9 (T₃) и 12 месеци (T₄). Сите мерења ги изврши еден калибриран испитувач (Cohen's $\kappa=0.87$) за да се обезбеди конзистентност на резултатите. На секоја контрола,

децата и нивните родители добиваа индивидуализирани упатства за орална хигиена нагласувајќи ја потребата од правилното четкање околу апаратот. Статистичката анализа беше спроведена со употреба на Friedman тест и пост-хок Wilcoxon signed-rank тест со Bonferroni корекција ($\alpha=0.05$). **Резултати:** Значајни разлики во вредностите на BPE беа забележани во текот на 12-месечниот период на набљудување ($\chi^2 = 17.42$, $df=4$, $p=0.002$). Вредностите се зголемија во првите три месеци ($T_0 \rightarrow T_1$, $p=0.018$), што укажува на привремено зголемување на гингивалната инфламација по поставување на апаратот. Потоа беше забележано постепено подобрување, со намалување на резултатите во следниве мерења ($T_1 \rightarrow T_3$, $p=0.021$; $T_1 \rightarrow T_4$, $p=0.008$). На крајот на студијата не беше утврдена значајна разлика помеѓу почетните и конечните вредности ($T_0 \rightarrow T_4$, $p > 0.05$), што укажува на опоравување и стабилизација на пародонталното здравје преку редовни контроли и поддршка од родителите. **Заклучок:** Основниот пародонтален преглед (BPE) се покажа како практичен, сигурен и соодветен метод за следење на пародонталното здравје кај деца кои се подложени на интерцептивен ортодонтички третман. Иако е забележано краткотрајно зголемување на гингивалната инфламација по поставувањето на апаратот, редовните контроли, постојаното подобрување на хигиенските навики и активното вклучување на родителите доведоа до значително подобрување на пародонталната состојба. Овие резултати ја нагласуваат важноста на вклучување на рутинската пародонтална проценка и континуирана едукација за орална хигиена во сите фази на раната ортодонтичка грижа. **Клучни зборови:** интерцептивна ортодонтација; основен пародонтален преглед; детска стоматологија; пародонтално здравје; орална хигиена; мобилни апарати.

Introduction

Interceptive orthodontics plays an essential role in early dental care, focusing on the timely management of developing malocclusions and promoting the balanced growth of children's dental arches. When addressed at the appropriate developmental stage, orthodontic intervention can correct both functional and skeletal irregularities before they progress into more complex conditions. Such early action not only improves oral function and aesthetics but also contributes to long-term oral health stability and a better quality of life^{1,2}.

However, these preventive benefits are often accompanied by challenges, particularly in maintaining good oral hygiene during treatment. Orthodontic appliances, especially removable ones, may interfere with routine brushing and make plaque control more challenging. As a result, plaque accumulation, gingival irritation, and the early signs of periodontal inflammation can appear even in otherwise healthy young patients³⁻⁶. Therefore, continuous evaluation of periodontal health is a vital component of interceptive orthodontic therapy to ensure that preventive efforts are not compromised by secondary complications⁷.

The Basic Periodontal Examination (BPE) is a simple, standardized, and minimally invasive method designed to screen periodontal health and indicate when further assessment or treatment may be required. Although initially developed for adult patients, both the British Society of Periodontology and Implant Dentistry (BSP) and the British Society of Paediatric Dentistry (BSPD) have adapted this approach for younger age groups through the simplified Basic Periodontal Examination (sBPE). This modification limits scoring to codes 0–2 and excludes partially erupted teeth, providing a reliable and age-appropriate method of recording bleeding on probing and detecting calculus or other plaque-retentive factors, key indicators of oral hygiene in pediatric care⁸⁻¹⁰.

While the diagnostic value of the BPE has been extensively documented in adults, its validation and routine use

among children, particularly those undergoing interceptive orthodontic treatment, has not yet been fully validated. Recent studies demonstrate encouraging findings regarding its feasibility in pediatric orthodontics and its potential for early detection of gingival changes¹¹⁻¹³. Nevertheless, compared with the adult population, data on BPE outcomes in growing patients remain relatively limited, emphasizing the need for further longitudinal studies^{14,15}.

It is also important to consider other established clinical indices, such as the Plaque Index by Silness and Løe and the Gingival Index by Løe and Silness, which have long been used to assess plaque accumulation and gingival inflammation^{16,17}. However, the efficiency, simplicity, and reproducibility of the BPE make it a valuable tool for large-scale screening and regular monitoring within daily orthodontic practice^{18,19}.

Taking these aspects into account, the present study aims to assess the periodontal condition of children aged 7–11 years undergoing interceptive orthodontic therapy with removable appliances. The Basic Periodontal Examination (BPE) is used as a practical and objective method for screening and tracking periodontal health throughout the treatment period.

Materials and methods

This prospective observational study included 30 children aged 7 to 11 years, all of whom were undergoing interceptive orthodontic treatment with removable appliances due to dental crowding. Participants were selected from the Orthodontic Department of the University Dental Clinic of Kosovo, based on their scheduled need for early orthodontic intervention. The selection process followed a consecutive sampling approach, meaning that all eligible patients presenting to the clinic during the recruitment period and meeting the inclusion criteria were invited to participate.

Prior to participation, the purpose of the study was explained to both children and their parents or legal

guardians, after which written informed consent was obtained. Ethical approval was granted by the institutional ethics committee, and the study was conducted in accordance with the Declaration of Helsinki for biomedical research involving human subjects.

To ensure consistency and minimize bias, strict eligibility criteria were applied.

Inclusion criteria:

- Children aged 7–11 years in the mixed dentition phase.
- Presence of mild to moderate dental crowding requiring interceptive orthodontic treatment with a removable appliance.
- Good general health and ability to comply with routine follow-up visits.

Exclusion criteria:

- Systemic diseases that could influence periodontal health (e.g., diabetes, autoimmune or immune-related disorders).
- Antibiotic therapy within three months before enrollment.
- Ongoing periodontal treatment or any baseline BPE score ≥ 3 , which could indicate unrelated pathology uncommon in this age group.
- Inability to comply with dental visits or irregular attendance.

Periodontal health was evaluated using the Basic Periodontal Examination (BPE) in accordance with the British Society of Periodontology and British Society of Paediatric Dentistry (BSP/BSPD) Guidelines for Children and Adolescents under 18 Years². All measurements were performed with a WHO periodontal probe (ball-ended, 0.5 mm tip, black band between 3.5 mm and 5.5 mm).

For this pediatric population, only codes 0–2 of the simplified BPE (sBPE) were applied, with partially erupted teeth excluded from probing, as recommended by the BSP/BSPD guidelines and the executive summary of the sBPE for the under-18 population^{2,4}. Six index teeth were assessed^{16,11,26,36,31, and 46}, and scores were recorded for each sextant.

All clinical assessments were performed by a single calibrated examiner (E.C), a specialist in orthodontics, to minimize inter-examiner variability. The intra-examiner agreement was verified using Cohen's kappa coefficient, yielding a value of 0.87, indicating high reliability¹¹.

The BPE was recorded at five time points: T₀: baseline, before appliance insertion; T₁: 3 months after insertion; T₂: 6 months; T₃: 9 months; and T₄: 12 months (at the end of the 12-month observation period).

At the start of treatment (T₀) and during each follow-up visit, children and their parents received standardized oral-hygiene education. Oral-hygiene instruction was based on the Modified Bass tooth-brushing technique, which involves placing the toothbrush bristles at a 45° angle toward the gingival margin and performing gentle vibratory motions to clean the gingival sulcus and adjacent tooth surfaces. This method is widely recommended for effective plaque removal in orthodontic and pediatric patients, as it targets areas most prone to plaque retention and gingival inflammation. Instructions included demonstrations of the Bass tooth-brushing technique using fluoridated toothpaste twice daily, with special attention to areas around the orthodontic appliance. Parents were encouraged to supervise brushing, and the use of soft toothbrushes and interdental brushes (where appropriate) was recommended. This preventive approach aimed to minimize plaque accumulation and gingival irritation throughout treatment^{2,4}.

All collected BPE scores were entered into IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA) for analysis. Descriptive statistics were used to summarize the distribution of BPE scores at each time point. The Shapiro–Wilk test was applied to assess data normality. For comparisons across time intervals, the Friedman test (non-parametric repeated-measures ANOVA) was used, followed by Wilcoxon signed-rank tests for pairwise comparisons with Bonferroni correction to adjust for multiple testing. A p-value < 0.05 was considered statistically significant.

Results

A total of 30 children (17 girls and 13 boys), aged 7 to 11 years (mean \pm SD: 9.0 \pm 1.2 years), completed the 12-month follow-up period. No participant discontinued or missed any scheduled examination, so all 30 children were included in the final analysis.

Overall BPE Score Distribution

The percentage distribution of the highest BPE scores recorded at each time point is presented in Table I. At baseline (T₀), 26.7 % of the children had a BPE score of 0, while 30 % had a score of 2, suggesting the presence of plaque or calculus deposits even before treatment.

At the 3-month examination (T₁), there was a noticeable increase in the proportion of children with BPE 2 (46.7 %), accompanied by a decrease in BPE 0 (16.7 %). This early rise likely reflected the initial challenges children faced in maintaining oral hygiene after the insertion of the orthodontic appliance.

Subsequently, from T₂ through T₄, the percentage of BPE 2 gradually declined, while that of BPE 0 steadily increased. By the end of the 12-month period (T₄), 40 % of

Table 1. Distribution of BPE Scores at Each Time Point

Time Point	BPE 0	BPE 0 (%)	BPE 1	BPE 1 (%)	BPE 2	BPE 2 (%)
T ₀	8	26.7 %	13	43.3 %	9	30.0 %
T ₁	5	16.7 %	11	36.7 %	14	46.7 %
T ₂	6	20.0 %	15	50.0 %	9	30.0 %
T ₃	9	30.0 %	13	43.3 %	8	26.7 %
T ₄	12	40.0 %	14	46.7 %	4	13.3 %

Table 2. Variation in BPE 2 Scores Between Time Points

Time Comparison	Change in Number of Children	Change in Percentage (%)	p-value
T ₀ → T ₁	+5	+16.7 %	0.018*
T ₁ → T ₂	-5	-16.7 %	0.024*
T ₂ → T ₃	-1	-3.3 %	0.374
T ₃ → T ₄	-4	-13.3 %	0.041*
T ₀ → T ₄	-5	-16.7 %	0.036*

*Significant at $p < 0.05$

the children had a BPE 0, and only 13.3 % had BPE 2, indicating an overall improvement in periodontal health.

At baseline, most children showed BPE 0 or 1, typical for this age group, while a smaller portion localized BPE 2 findings, mainly in crowded anterior regions.

After appliance insertion (T₁), shallow calculus deposits and bleeding on probing were noted, especially in areas covered by the appliance.

By T₂ and T₃, periodontal health improved in most participants, particularly those who complied with brushing instructions.

At the final 12-month evaluation (T₄), no BPE ≥ 3 or clinical attachment loss was recorded. The progressive decline of BPE 2 over time reflects effective hygiene reinforcement and adaptation to the appliance.

Using the Friedman test for repeated measures, a statistically significant difference in BPE values across time points was observed ($\chi^2 = 17.42$, $df = 4$, $p = 0.002$).

Post-hoc Wilcoxon signed-rank tests with Bonferroni correction showed that:

- BPE scores increased significantly from T₀→T₁($p=0.018$); then decreased significantly

Table 3. Statistical comparison of BPE scores across evaluation time points

Comparison	Statistical Test	χ^2 / Z Value	df	p-value	Significance ($\alpha = 0.05$)
Overall difference (T ₀ -T ₄)	Friedman test	$\chi^2 = 17.42$	4	0.002	Significant
T ₀ → T ₁	Wilcoxon signed-rank	Z = -2.37	-	0.018	Significant
T ₁ → T ₂	Wilcoxon signed-rank	Z = -2.25	-	0.024	Significant
T ₁ → T ₃	Wilcoxon signed-rank	Z = -2.31	-	0.021	Significant
T ₁ → T ₄	Wilcoxon signed-rank	Z = -2.65	-	0.008	Highly significant
T ₀ → T ₄	Wilcoxon signed-rank	Z = -1.12	-	> 0.05	Not significant

between $T_1 \rightarrow T_3$ ($p = 0.021$) and $T_1 \rightarrow T_4$ ($p = 0.008$); the difference between $T_0 \rightarrow T_4$ was not significant ($p > 0.05$), indicating that periodontal status returned to baseline or improved beyond baseline.

stabilization of gingival health as children adapted to cleaning around their appliances.

Influence of Demographic Factors

No significant differences were found between girls and boys ($p > 0.05$; Mann-Whitney U test), or between younger (≤ 9 years) and older (> 9 years) participants ($p > 0.05$). All children used similar removable acrylic appliances, minimizing device-type variability.

Graphical Overview

Figure 1 shows the reduction in BPE 2 and the corresponding rise in BPE 0 over 12 months.

Figure 2 illustrates percentage distributions, highlighting an early brief deterioration followed by recovery and

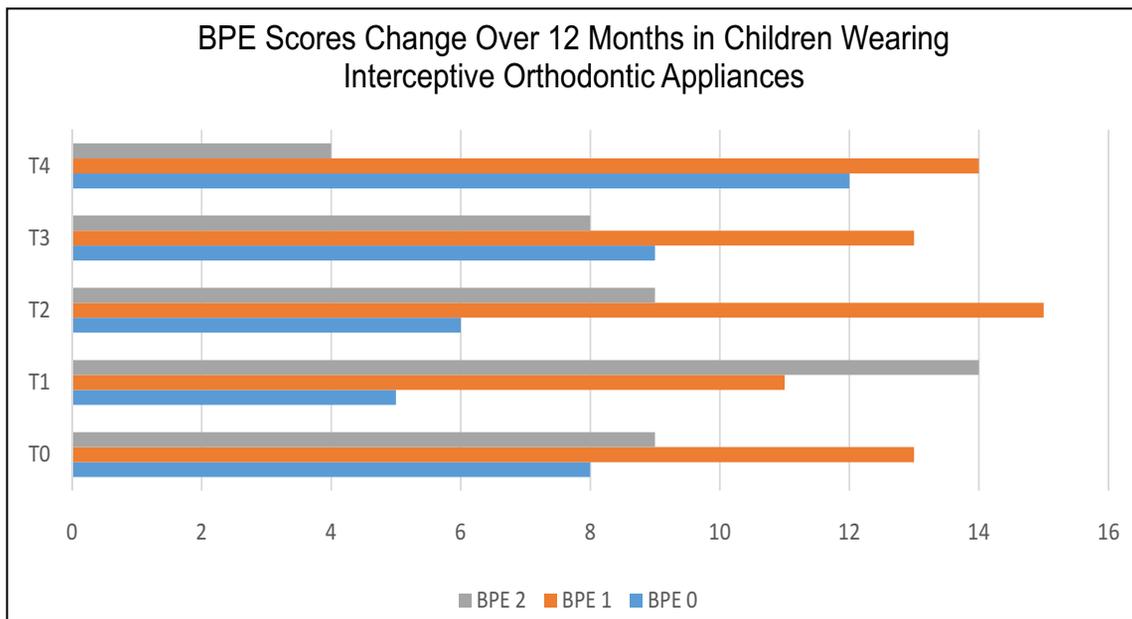


Figure 1. Changes in BPE 0 and BPE 2 scores in children over the 12-month treatment period

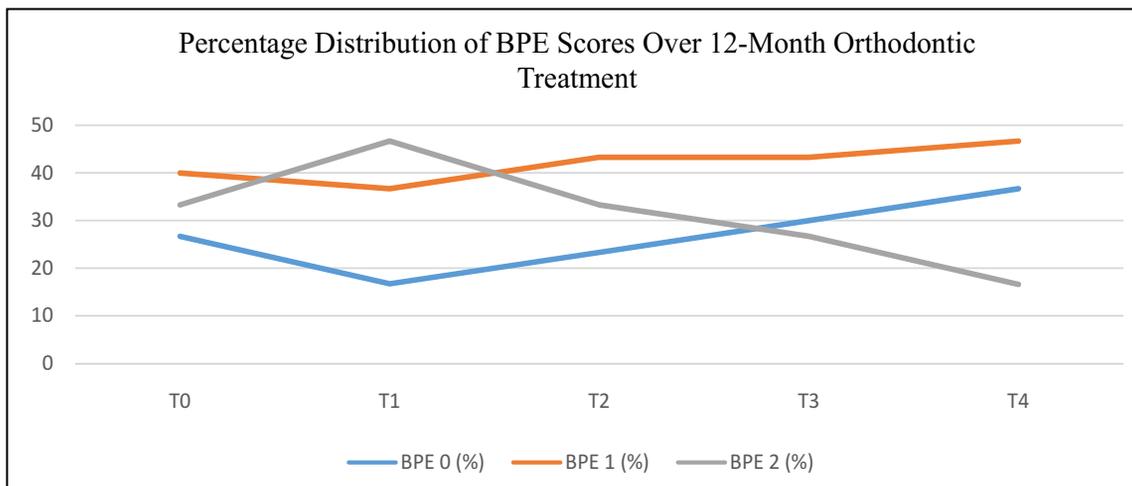


Figure 2. Percentage distribution of BPE scores (0,1,2) across five evaluation time points (T_0 – T_4).

Table 4. Comparison of mean BPE score changes according to gender and age group.

Variable	Category	Mean BPE Change (T ₀ -T ₄)	Statistical Test	p-value	Interpretation
Gender	Girls (n = 17)	-0.32 ± 0.18	Mann-Whitney U	> 0.05	Not significant
	Boys (n = 13)	-0.28 ± 0.21			
Age group	≤ 9 years (n = 15)	-0.30 ± 0.19	Mann-Whitney U	> 0.05	Not significant
	> 9 years (n = 15)	-0.31 ± 0.20			
Appliance type	Removable	—	—	—	All participants used identical appliance design

Discussion

The findings of this study emphasize the importance of regular monitoring of periodontal health throughout interceptive orthodontic treatment in children. Although removable appliances are a valuable tool for guiding dental and skeletal development at an early age, maintaining adequate oral hygiene during therapy remains a significant challenge, especially in the initial months of appliance use^{20,21}.

In the early treatment phase, a noticeable rise in BPE score 2 was observed in 34% of participants, indicating mild gingival inflammation and the presence of areas prone to plaque accumulation. This transient deterioration corresponds to reports by Tufekci et al. (2011), who noted a 30% prevalence of BPE 2 after the first three months of removable appliance therapy²². Similarly, Ireland et al. (2014) recorded a short-term increase in gingival bleeding and plaque accumulation during the initial phase of treatment, particularly in younger patients who required additional reinforcement of instructions²³. These findings suggest that early gingival changes are largely reversible and closely related to adaptation time and oral hygiene behavior.

By the sixth month of observation, the percentage of children with BPE 2 in our study had decreased to 18%, while the majority (74%) exhibited BPE scores of 0 or 1 at nine months, reflecting the restoration of gingival health. This improvement aligns with the results of Cassetta et al. (2023), who reported a decline in gingival inflammation from 36% to 19% over a six-month follow-up in children treated with removable appliances²⁴. Likewise, Ziebart et al. (2024) found that after continuous hygiene reinforcement, bleeding on probing decreased by approximately 40% compared with baseline values²⁵.

The biological and behavioral mechanisms behind this pattern are well established. The introduction of an orthodontic appliance temporarily alters the oral microenvironment, reducing natural self-cleaning, modifying salivary flow, and changing the bacterial composition of dental biofilm²⁶. Concurrently, young patients must adapt their brushing habits and motor coordination to effectively clean around the appliance. Once these habits improve and parental supervision increases, plaque accumulation decreases and gingival inflammation subsides.

A particular strength of the present study was the inclusion of parents in the oral hygiene education process. Parental participation has been associated with significantly higher adherence and motivation among orthodontic patients²⁷. Families who actively monitored daily brushing demonstrated more stable BPE scores and lower plaque accumulation, confirming the value of shared responsibility among clinicians, parents, and children.

Clinically, these findings underscore that periodontal care should represent an integral part of every interceptive orthodontic plan. Routine follow-up visits, continuous hygiene reinforcement, and early detection of gingival changes are essential to prevent irreversible periodontal changes. Genco et al. (2015) emphasized that sustained plaque control during childhood contributes to the long-term prevention of periodontal disease and supports healthier outcomes in adulthood²⁸.

The Basic Periodontal Examination (BPE) proved to be a practical and effective screening tool for assessing periodontal status in this young population. Despite its adult-based origin, the simplified version (sBPE) has been successfully validated for children and adolescents^{8,11,29}. When used together with the Plaque Index (Silness & Løe) or the

Gingival Bleeding Index, it offers a comprehensive, time-efficient tool for evaluating periodontal health, allowing clinicians to identify children at risk of developing gingival pathology^{16,17,30}.

Study limitations

This study's main limitations include the modest sample size (n=30) and the absence of a control group, which limits the generalizability of findings. Additionally, only one type of removable appliance was evaluated, and the sample represented a narrow age range (7–11 years). These factors may influence the external validity and restrict extrapolation to other age groups or appliance types. Future studies including a control cohort, multiple appliance designs, and longer follow-up periods are needed to confirm these observations.

Clinical implications and concluding remarks

Within the limitations of this study, the results demonstrate that periodontal changes during interceptive orthodontic treatment are mild, transient, and reversible when proper hygiene instruction and regular monitoring are provided. The Basic Periodontal Examination (BPE), due to its simplicity, reproducibility, and diagnostic value, should be considered a standard screening procedure during interceptive orthodontic therapy in children. Regular monitoring with BPE not only facilitates early detection of gingival alterations but also reinforces preventive education, ensuring healthier and more stable orthodontic outcomes in the pediatric population.

Conclusion

The results of this study indicate that the Basic Periodontal Examination (BPE) is a practical, valid, and clinically valuable tool for monitoring periodontal health in children undergoing interceptive orthodontic treatment with removable appliances. A temporary increase in gingival inflammation was observed in the early phase of treatment, but this resolved as patients adapted to improved oral hygiene routines with ongoing guidance and supervision.

Regular follow-up visits, active parental involvement, and ongoing reinforcement of oral hygiene instructions were shown to be decisive factors in maintaining periodontal stability throughout therapy. These findings suggest that incorporating the BPE as a routine screening procedure in interceptive orthodontic care can facilitate the early detection of initial periodontal changes before irreversible alterations occur, supporting timely preventive action and enhancing long-term orthodontic success.

Although this study involved a relatively small sample and a single treatment protocol, its findings provide valuable insight into the use of BPE as a reliable and practical screening tool in pediatric orthodontics. Future studies including larger and more diverse populations, extended observation periods, and complementary periodontal indices are encouraged to further validate its diagnostic applicability in clinical practice.

Conflict of interest

The authors declare no conflicts of interest related to this study. All authors have read and approved the final version of the manuscript.

Funding

This study was conducted independently and did not involve any external funding sources. The study was conducted as part of academic and clinical activities within the University Dental Clinical Center of Kosovo.

Ethical approval

The study protocol was reviewed and approved by the Ethics Committee of the Kosovo Dental Chamber and the Ethics Committee of the University Clinical Stomatological Center of Kosovo. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki for biomedical research involving human subjects. Written informed consent was obtained from all participants' parents or legal guardians prior to enrollment.

Reference

1. Sukhtankar LV, Mahajan B, Agarwal P. Treatment of lower lip mucocele with diode laser – A novel approach. *Ann Dent Res.* 2013;2(Suppl 1):102–8.
2. Yagüe-García J, España-Tost AJ, Berini-Aytés L, Gay-Escoda C. Treatment of oral mucocele-scalpel versus CO 2 laser. *Med Oral Patol Oral Cir Bucal.* 2009;14:e469–74.
3. Kilinc, A.; Saruhan, N.; Gundogdu, B.; Yalcin, E.; Ertas, U.; Urvaszizoglu, G. Benign Tumors and Tumor-like Lesions of the Oral Cavity and Jaws: An Analysis of 709 Cases. *Niger. J. Clin. Pract.* 2017, 20, 1448–1454
4. Bagán Sebastián JV, Silvestre Donat FJ, Peñarrocha Diago M, MiliánMasanet MA. Clinico-pathological study of oral mucocèles. *Av Odontostomatol.* 1990;6:389–91. 394.
5. Neville B, Damn DD, Allen CM, Bouquot JJ. *Oral and Maxillofacial Pathology.* 2nd ed. Philadelphia: W. B. Saunders; 2002. pp. 389–92
6. Baumash HD. A case against sublingual gland removal as primary treatment of ranulas. *J Oral Maxillofac Surg.* 2007;65:117-21
7. Baumash HD. Mucocèles and ranulas. *J Oral Maxillofac Surg.* 2003;61:369-78
8. Baumash H The etiology of superficial oral mucocèles. *J Oral Maxillofac Surg.* 2002;60:237–8. doi: 10.1053/joms.2002.30877.
9. Pinto, A.; Haberland, C.M.; Baker, S. Pediatric Soft Tissue Oral Lesions. *Dent. Clin. N. Am.* 2014, 58, 437–453.
10. Barbería E, Lucavechi T, Cárdenas D, Maroto M. An atypical lingual lesion resulting from the unhealthy habit of sucking the

-
- lower lip: Clinical case study. *J Clin Pediatr Dent.* 2006;30:280–2. doi: 10.17796/jcpd.30.4.p20272221365477w.
11. Huang IY, Chen CM, Kao YH, Worthington P. Treatment of mucocele of the lower lip with carbon dioxide laser. *J Oral Maxillofac Surg.* 2007;65:855–8. doi: 10.1016/j.joms.2006.11.013.
12. McDonald RE, Avery DR, Jeffrey A. Dean – *Dentistry for the child and adolescent.* 8th ed. Missouri: Mosby – St Louis; 2004.