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Evaluation of the Effect of Initial Periodontal Treatment with Additional Occlusal Adjustment on Quality of Life and Tooth Mobility

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ABSTRACT

The aim of this research was to evaluate the short-term effects of initial periodontal treatment (IPT) with occlusal adjustment (OA) on lower incisors on Oral Health Impact Profile-14 (OHIP-14), clinical parameters such as probing depth (PD), bleeding on probing (BoP), gingival index (GI), clinical attachment loss (CAL), and tooth mobility using the periostest device in 30 patients with periodontitis. The patients were randomly divided into two equal groups as the test and control groups. The control group received IPT alone, while the test group received IPT+OA. The OA was applied to only four lower incisors (42, 41, 31, 32) and data were recorded at baseline (T0) and at one month after treatment (T1). There was no significant difference in the total OHIP-14 scores between the groups. The inter-group comparison revealed a significant difference in the GI of 42 teeth and in the CAL of 41 teeth ($p<0.05$). A significant difference was observed in the periotest value of 42 teeth between the time points ($p<0.05$). There was a significant difference in the clinical periodontal parameters in both groups at T0 and T1, while there was a significant difference in the tooth mobility of 42 teeth in the test group ($p<0.05$). In conclusion, IPT yields positive effects on clinical periodontal parameters in both groups in both time points. However, IPT combined with OA seems not to be superior to IPT only as evidenced by OHIP-14 scores, periodontal parameters, and tooth mobility in the short-term. Further long-term studies are needed to draw more reliable conclusions.

Keywords: Occlusal adjustment; quality of life; periodontitis; tooth mobility

Introduction

Periodontitis is an inflammatory chronic disease that causes bone loss by destroying tooth-supporting tissues (1). In the new classification of periodontal diseases, deterioration in tooth mobility, tooth migration, and chewing function in Stage IV periodontitis are among the clinical symptoms of disease progression (2). With this devastating, infectious disease, phonation and dysfunction may occur due to tooth mobility and secondary occlusal trauma. It has been reported that occlusal trauma does not initiate periodontitis and does not have strong evidence that it changes the progression of the disease (3). The prognosis of the tooth/teeth against occlusal forces may change and tooth mobility may increase in parallel with the severity of the disease and the amount of attachment lost. However, it has been reported that occlusal adjustment (OA) treatment should be considered when tooth mobility increases, if the patient's comfort or function is at risk, or if periodontal regeneration is planned (4). On the other hand, OA may provide improvement in clinical attachment loss (CAL) in mobile and/or premature contact teeth, but its effect on other periodontal parameters is still unclear (5). However, OA increases patient comfort, and it can be recommended as an adjunct procedure to initial periodontal treatment (IPT) (3). In this procedure, selective abrasion is performed in a harmonious and controlled manner between the maxillary and mandibular teeth. Therefore, by creating a new contact relationship, mobility and unbalanced loads on the tooth/teeth are reduced during the chewing function. As a result, occlusion of periodontal damaged teeth can be designed to parallel the reduction in periodontal attachment and reduce forces within periodontal adaptation.

Oral Health-related Quality of Life (OHRQoL) is a phenomenon that covers the biopsychosocial conditions of oral health and combines multiple concepts (6). The Oral Health Impact Profile (OHIP) survey is one of the tools used to measure OHRQoL (6,7). The OHIP was first developed by

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Slade and Spencer (8) in Australia. Then, as its shortened version, OHIP-14 developed, consisting of 14 items (7). In particular, OHIP-14, with some questions, can help the patient understand the unpleasant situations caused by the effect of moving teeth on their function and phonation. OA in addition to IPT that reduces periodontal inflammation can promote the regeneration of surrounding tissues, and reduces tooth mobility. This may contribute positively to the patient's quality of life. In a recent study conducted with OHIP-14, non-surgical IPT showed a positive effect on quality of life (9).

The present research aimed to evaluate the short-term effects of OA applied in addition to initial IPT on OHIP-14, clinical periodontal parameters and tooth mobility in mandibular incisors with reduced periodontal support. The null-hypothesis (H0) was that OA had no statistically significant difference on OHIP-14 and clinical periodontal parameters in the short term.

Materials and Methods

This single-center study was conducted at Van Yuzuncu Yil University, Faculty of Dentistry, Department of Periodontology. The study protocol was approved by Van Yuzuncu Yil University, Clinical Research Ethics Committee with the Approval No: 04 and Approval Date: 18/01/2023. The study was managed in accordance with the Declaration of Helsinki. Each patient provided a signed written statement of informed consent. The sample size was determined according to a previous article on a similar topic (10).

Inclusion criteria of study were as follows: age between 18 and 65 years, having a diagnosis of Stage III-IV and Grade B periodontitis, having no surgical periodontal treatment for lower anterior teeth. The relationship between the jaws was evaluated. Accordingly, patients in whom there was occlusal contact on all lower incisors during closing and right-left lateral movements of the lower jaw and mobility of the teeth were included in the research. Exclusion criteria were as follows: having vertical mobility in any of the lower anterior teeth, having an orthodontic problem (such as deep bite, open bite), having a temporomandibular joint problem or receiving treatment for this problem, having a parafunctional habit (such as bruxism, pencil biting, nail biting), having any prosthetic and/or restorative restoration or implant in the lower anterior region, receiving IPT within the past six months, and being illiterate. Participants who met the criteria were randomly assigned to study groups from a list according to the order of clinic admission. A total of 30 patients were randomly divided into two equal groups as the study and control groups including 15 patients in each group. The control group received IPT alone, while the study group received IPT+OA. Lower incisors with No. 42, 41, 31, 32 were included for each patient. Data were recorded at baseline (T0) and at one month after treatment (T1).

Periodontal clinical parameters: Clinical periodontal parameters were recorded with a periodontal probe (UNC 15 probe; Hu-Friedy, Chicago, IL, USA) from the area below the relevant teeth. These parameters included probing depth (PD; distance from gingival margin to sulcus base), gingival index (GI) (11), and clinical attachment loss (CAL; distance from cementoenamel junction to sulcus base), and bleeding on probing (BoP) (12).

Evaluation of tooth mobility: Tooth mobility was measured using a periotest device placed in the center of the tooth No. 42, 41, 31, and 32 (Periotest M device; Medizintechnik Gluden, Modautal, Germany). The device uses 16 pulses within 4 sec during each measurement. The tip of the periotest device is placed in a horizontal position about 2 mm away from the tooth surface. The periotest value was recorded at T0 and T1 for each tooth separately.

Initial periodontal treatment and occlusal adjustment: All patients received a single session of full-mouth IPT. First, an ultrasonic instrument and various scrapers (1-2, 3-4 Gracey curettes, Hu-Friedy, Chicago, IL, USA) were used. Then, the roughness on the tooth surfaces was removed by airpolishing. All subgingival pockets were washed with physiological saline. Controlled OA was applied to the lower incisors of the patients in the test group only with the help of an articulation paper before starting the treatment. Accordingly, OA is made to ensure equal and stable tooth contacts in centric occlusion and to eliminate contacts that would prevent smooth sliding in protrusive and lateral movements. (13) Then, all patients were given the same oral hygiene instructions and the same recommendations to reduce trauma to their front teeth (such as avoiding forces such as biting or tearing through the front teeth, not pushing the teeth with the tongue). All parameters of all participants were recorded one month after treatment. Administration of treatments and collection of data were conducted by a single investigator

(C.T.). OA was applied by an independent researcher, and the researcher (C.T) who collected the data worked blindly to the groups. The researcher (C.T.) was unaware of which group OA was applied. All patients were enrolled in the maintenance phase after data was collected. Patients whose follow-up was completed were taken into the maintenance phase.

OHIP-14 assessment: All patients completed the OHIP-14 questionnaire at T0 and T1. The survey consists of 14 questions covering seven dimensions: functional limitation, handicap, psychological disability, psychological discomfort, physical disability, physical pain and social disability, with two questions for each domain. Responses were coded on a 5-point Likert scale with values ranging from 0 to 4 as follows: 0 "never," 1 "rarely," 2 "occasionally," 3 "fairly often," or 4 "very often." Responses of the OHIP-14 can range from 0 to 56, with a higher score indicating poorer oral health-related quality of life. The reliability (Cronbach Alpha: 0.74) and repeatability (r: 0.932) of the Turkish form of the OHIP-14 scale have been reported (14). In our study, both the total OHIP-14 score average of each group and the seven dimensions of this scale were evaluated.

Statistical Analysis: Statistical analysis was performed using the SPSS version 21.0 software (IBM Corp., Armonk, NY, USA). Descriptive data were expressed in mean ± standard deviation (SD), median (min-max), or number and frequency. The Kolmogorov-Smirnov test was used for the variable's distribution. The Mann-Whitney U test was used to compare independent groups. The Wilcoxon test was used to compare dependent (baseline – re-evaluation one month after IPT) groups. In addition, the chi-square test was performed to determine the relationship between categorical variables and $p<0.05$ was considered statistically significant.

Results

Demographic characteristics of the patients are summarized in Table 1. A total of 30 patients, 21 females and 9 males with a mean age of 36.60±9.50 (range, 21 to 61) years, were included in the study. There was no significant difference in the mean age of the test and control groups.

The inter- and intra-group comparisons of the OHIP-14 scores are shown in Table 2. Accordingly, the median scores for physical disability (poor diet and break from eating) were 3.00 at T0 and 4.00 at T1 in the control group, indicating a statistically significant difference ($p<0.05$). The inter-group comparisons revealed no significant difference in any of the seven dimensions. In addition, there was no significant difference in the inter- and intra-group comparisons of the total OHIP-14 scores.

The inter- and intra-group periodontal parameters and periotest values are shown in Table 3. Accordingly, there was a significant difference in the PD, BoP, GI, and CAL values of teeth No. 42 and 41 in both the study and the control groups between T0 and T1 ($p<0.05$). No significant difference was found in the intra-group comparisons of periotest value of tooth No. 42 and 41 in the control group. However, there was a significant difference in the intra-group comparisons of periotest value of tooth No. 42 in the test group ($p<0.05$). The mean periotest value of tooth No. 42 decreased from 10.20±9.36 to 9.30±9.37 in the test group. The inter-group comparisons revealed no significant difference in the PD, BoP, CAL, and periotest value of tooth No. 42 in the test and control groups, both at T0 and T1. However, there was a significant difference in the GI value ($p<0.05$). The inter-group comparisons showed a significant difference in the baseline BoP and post-treatment CAL of tooth No. 41 ($p<0.05$).

There was a significant difference in the PD, BoP, GI, and CAL of tooth No. 31 and 32 in the test and control groups ($p<0.05$), while there was no significant difference in the periotest value between the groups. The inter-group comparison showed a significant difference in the baseline BoP value of tooth No. 31 and 32 ($p<0.05$).

The inter-group comparisons at different time points are shown in Table 4. Accordingly, no significant difference in any of the clinical parameters and total OHIP-14 scores, except for the BoP values of tooth No. 31. There was a significant difference in the periotest value of tooth No. 42 between T0 and T1 ($p<0.05$).

Discussion

In the present research, we evaluated the short-term effects of OA applied in addition to initial IPT on OHIP-14, clinical periodontal parameters and tooth mobility in mandibular incisors with reduced periodontal support. Our study results showed that IPT yielded a positive effect on clinical periodontal parameters in periodontitis patients in whom OA was performed, while it had a statistically significant effect on only one tooth in terms of tooth mobility. Also OA combined

Table 1. Descriptive Statistics for Age by Groups and Sex

	N	Mean	Std. Dev.	Min	Max	p
Control Group	15	37.33	9.42	21	54	
Test Group	15	35.87	9.84	21	61	0.68
Total	30	36.60	9.50	21	61	
Female	21	36.57	10.93	21	61	
Male	9	36.67	5.31	30	43	0.98

p<0.05, statistically significant different

Table 2. Descriptive Statistics and Comparison Results for the OHIP-14

		Control Group					Test Group					
		Median	Mean	St. Dev.	Min.	Max.	Median	Mean	St. Dev.	Min.	Max.	p #
Function limitation	T0	.00	1.20	1.65	.00	6.00	1.00	2.00	2.44	.00	7.00	0.44
	T1	2.00	1.40	1.24	.00	3.00	2.00	1.60	1.45	.00	4.00	0.74
	pϕ			0.33					0.26			
Physical pain	T0	4.00	3.93	3.34	.00	8.00	4.00	3.60	2.06	.00	6.00	0.73
	T1	3.00	3.66	2.63	.00	8.00	3.00	2.53	1.50	.00	5.00	0.20
	pϕ			0.77					0.47			
Psychological discomfort	T0	5.00	4.26	2.40	.00	8.00	4.00	4.53	2.03	.00	7.00	0.86
	T1	4.00	3.73	2.12	.00	7.00	4.00	4.53	2.13	.00	8.00	0.28
	pϕ			0.62					0.88			
Physical disability	T0	3.00	3.00	2.07	.00	8.00	3.00	2.46	1.84	.00	6.00	0.44
	T1	4.00	3.60	2.19	.00	8.00	2.00	2.66	1.29	.00	5.00	0.12
	pϕ			0.04*					0.76			
Psychological disability	T0	3.00	3.00	2.39	.00	8.00	3.00	2.73	2.15	.00	8.00	0.93
	T1	2.00	2.33	1.75	.00	6.00	2.00	1.80	1.47	.00	6.00	0.29
	pϕ			0.21					0.25			
Social disability	T0	3.00	3.00	2.42	.00	8.00	3.00	2.73	2.01	.00	6.00	0.80
	T1	2.00	2.40	2.61	.00	7.00	2.00	2.06	2.21	.00	6.00	0.73
	pϕ			0.43					0.20			
Handicap	T0	1.00	1.40	1.80	.00	6.00	1.00	1.66	1.44	.00	4.00	0.39
	T1	.00	0.93	1.38	.00	4.00	.00	1.06	1.38	.00	4.00	0.74
	pϕ			0.26					0.20			
Total score of OHIP-14	T0	16.00	19.33	11.51	.00	41.00	21.00	19.73	9.34	7.00	37.00	0.75
	T1	16.00	18.06	10.72	1.00	39.00	15.00	16.26	6.39	4.00	33.00	0.90
	pϕ			0.90					0.15			

#: Inter-group comparison [Mann-Whiney U test];ϕ: Intra-group at the end of treatment – Baseline [Wilcoxon testi]; *p < 0.05

Max, maximum; Min, minimum; OHIP-14, Oral Health Impact Profile-14; St. Dev, standard deviation; T0, baseline; T1: Re-evaluation 1 month after non-surgical periodontal treatment; p<0.05, statistically significant different

Table 3. Descriptive Statistics and Comparison Results for Periodontal Parameters and Periotest Values

Number of teeth			Control Group					Test Group					
			Median	Mean	St. Dev.	Min.	Max.	Median	Mean	St. Dev.	Min.	Max.	p #
42	PD (mm)	T0	2.50	2.83	1.24	1.50	5.83	2.66	2.81	0.96	1.33	4.33	0.80
		T1	1.50	1.86	0.91	1.00	4.16	1.50	1.59	0.44	1.16	2.50	0.65
		pϕ			0.001*					0.001*			
	BoP (%)	T0	50.00	49.01	25.28	1.00	83.33	50.00	47.77	17.66	16.66	83.33	0.63
		T1	16.66	19.99	20.11	.00	66.66	16.66	18.88	10.66	.00	33.33	0.79
		pϕ			0.001*					0.001*			
	GI	T0	2.33	2.45	0.51	1.83	3.50	1.83	1.72	0.75	0.66	2.83	0.01*
		T1	1.33	1.25	0.64	0.16	2.50	0.83	0.79	0.47	0.16	1.83	0.03*
		pϕ			0.001*					0.001*			
	CAL (mm)	T0	3.50	4.14	1.757	2.16	7.83	5.16	4.80	1.36	2.16	7.16	0.12
		T1	3.33	3.37	1.428	1.50	6.16	3.83	3.87	1.04	1.83	6.16	0.24
		pϕ			0.002*					0.001*			
	Periotest	T0	13.60	13.59	9.488	2.90	35.20	10.20	13.40	9.36	-0.20	34.70	0.98
		T1	11.00	13.60	10.056	3.10	37.60	9.30	11.36	9.37	0.40	31.60	0.34
		pϕ			0.92					0.009*			
41	PD (mm)	T0	2.83	2.97	1.18	1.33	6.16	2.66	2.85	1.287	1.16	5.50	0.56
		T1	1.83	1.81	0.55	1.16	2.83	1.50	1.56	0.545	1.00	2.83	0.18
		pϕ			0.001*					0.001*			
	BoP (%)	T0	66.66	63.33	24.56	16.66	100.00	50.00	43.33	13.80	16.66	66.66	0.01*
		T1	16.66	28.88	14.73	16.66	50.00	16.66	18.88	13.89	.00	33.33	0.11
		pϕ			0.001*					0.001*			
	GI	T0	2.50	2.23	0.71	0.33	3.33	1.83	1.98	0.594	0.50	2.83	0.24
		T1	0.83	0.99	0.75	.00	2.16	1.16	1.00	0.478	0.16	1.83	0.72
		pϕ			0.001*					0.001*			
	CAL (mm)	T0	4.83	4.90	1.44	1.33	7.16	5.83	5.69	1.21	3.50	7.83	0.15
		T1	3.83	3.68	1.21	1.33	5.50	4.66	4.57	0.78	2.66	5.50	0.02*
		pϕ			0.001*					0.001*			
	Periotest	T0	21.00	22.12	11.63	7.50	50.00	18.40	20.14	9.74	6.00	40.00	0.82
		T1	16.30	21.08	11.91	6.60	50.00	19.30	19.15	10.45	3.80	35.90	0.75
		pϕ			0.46					0.12			
31	PD (mm)	T0	3.00	2.99	1.20	1.33	5.16	2.33	2.70	1.07	1.33	5.33	0.53
		T1	2.16	2.01	0.77	1.00	3.50	1.50	1.56	0.41	1.00	2.66	0.13
		pϕ			0.001*					0001*			
	BoP (%)	T0	83.33	78.88	23.11	50.00	100.00	33.33	42.21	17.66	16.66	66.66	0.001*
		T1	33.33	23.33	23.40	.00	50.00	16.66	19.99	12.90	.00	33.33	0.69
		pϕ			0.001*					0.001*			
	GI	T0	2.16	2.18	0.82	0.160	3.50	2.16	2.08	0.56	0.83	2.83	0.69
		T1	1.00	0.99	0.55	.00	2.00	0.83	0.94	0.54	0.16	2.00	0.72
		pϕ			0.001*					0.001*			
	CAL (mm)	T0	4.83	4.66	1.41	1.33	7.16	4.83	5.19	1.04	3.50	7.16	0.44
		T1	4.00	3.81	1.09	1.33	5.83	4.00	3.98	0.85	2.83	5.83	0.73
		pϕ			0.003*					0.001*			

	Periotest	T0	17.00	20.22	10.72	8.30	50.00	21.30	23.02	11.48	4.90	42.10	0.39
		T1	15.50	19.39.	11.09	7.60	50.00	20.90	21.88	10.60	7.40	38.60	0.45
		pϕ			0.09					0.19			
	PD (mm)	T0	2.16	2.51	1.02	1.50	5.16	2.25	2.68	1.14	1.83	5.50	0.91
		T1	1.83	1.78	0.52	1.16	2.83	1.33	1.50	0.64	1.00	3.50	0.06
		pϕ			0.001*					0.001*			
	BoP (%)	T0	66.66	61.10	28.63	16.66	100.00	33.33	40.54	16.75	1.00	66.66	0.03*
		T1	33.33	24.44	18.75	.00	50.00	16.66	21.42	15.23	.00	50.00	0.61
		pϕ			0.001*					0.009*			
	GI	T0	1.83	1.79	0.67	0.66	2.83	2.08	2.04	0.68	0.50	3.33	0.2
32		T1	0.66	0.79	0.53	.00	1.83	0.66	0.69	0.38	0.16	1.50	0.67
		pϕ			0.001*					0.001*			
	CAL (mm)	T0	3.50	3.74	1.13	1.50	6.16	4.08	4.42	1.24	3.00	6.83	0.13
		T1	2.16	2.45	0.90	1.33	4.83	3.08	3.15	1.18	1.50	5.50	0.09
		pϕ			0.001*					0.001*			
	Periotest	T0	11.50	11.51	6.40	4.70	27.20	10.40	14.11	9.68	0.20	32.00	0.48
		T1	10.60	10.92	6.19	3.60	25.10	11.50	13.40	9.03	0.20	28.20	0.43
		pϕ			0.27					0.42			

#: Inter-group comparison [Mann-Whiney U test]; $^{\phi}$: Intra-group at the end of treatment-Baseline [Wilcoxon test]; *p < 0.05

BoP, bleeding on probing; CAL, clinical attachment loss; GI, gingival index; Max, maximum; Min, minimum; PD, probing depth; St. Dev, standard deviation; T0, baseline; T1, Re-evaluation 1 month after initial periodontal treatment; p<0.05, statistically significant different.

with IPT revealed no significant effect on the total OHIP-14 scores. The H0 hypothesis is partially accepted.

Different types of periodontal diseases affect the quality of life of patients at various levels. This may become a problem, particularly in periodontitis patients, as the disease reaches more advanced levels. In a recent study, periodontitis patients had worse OHRQoL than gingivitis patients (15). Since periodontal diseases are related to OHRQoL (16), IPT in the presence of periodontal disease has a positive relationship with the patient's OHRQoL (17). Poor oral hygiene can affect the connective tissue and alveolar bone around teeth. If treatment is delayed, teeth lose their support and periodontitis may occur. This may cause tooth mobility and tooth loss. Scaling and root planing (SRP), which is considered the gold-standard treatment in the therapy of periodontitis, has had its clinical effectiveness documented in a systematic review (18). Treatment of chronic periodontitis with SRP was associated with an improvement in CAL (18). Treatment such as SRP, which is performed by reaching deeper tissues compared to supragingival scaling, has a better effect on OHRQoL (16). It has even been suggested that periodontal therapy can improve glycemic control in persons who have diabetes mellitus, and periodontitis treatment can positively improve OHRQoL (19). On the other hand, Ohrn and Jonsson (20) did not observe any improvement in OHRQoL via OHIP-14 after dental hygiene treatment. Basher et al. (21) found no significant results of non-surgical periodontal therapy on OHRQoL in their study in patients with obesity and chronic periodontitis. In our research, no statistically significant difference was obtained in the inter-group evaluation in terms of total OHIP-14 scores before and after treatment. This may be due to the short-term study design and the fact that this data is a subjective finding. Additionally, this result suggests that patients' expectations in treatment may not have been met.

Tooth mobility that occurs with periodontitis may increase the patient's concern about tooth loss. However, Haang et al. (22) reported that tooth loss was negatively associated with quality of life in terms of health. However, the same authors noticed mixed and ambiguous results regarding the relationship between periodontal disease and health-related quality of life (22). After considering these details, in our research, we attempted to reduce the trauma on mobile teeth by applying OA to the teeth in the test group; therefore, it was thought that the patient's fear of

Table 4. Changes in Clinical Parameters, Periotest Values, and total OHIP-14 Scores between T0 and T1

Number of teeth			N	Mean	Std. Deviation	p
	PD (mm)	Control Group	15	0.96	0.58	
		Test Group	15	1.22	0.70	0.29
		Total	30	1.09	0.65	
	BoP (%)	Control Group	15	29.02	36.13	
		Test Group	15	28.89	14.72	0.99
		Total	30	28.95	27.10	
	GI	Control Group	15	1.19	0.50	
42		Test Group	15	0.93	0.61	0.20
		Total	30	1.06	0.56	
	CAL	Control Group	15	0.76	0.70	
		Test Group	15	0.93	0.52	0.47
		Total	30	0.85	0.61	
	Periotest	Control Group	15	-0.00	2.52	
		Test Group	15	2.04	2.24	0.02*
		Total	30	1.01	2.56	
	PD	Control Group	15	1.15	0.88	
		Test Group	15	1.28	1.14	0.72
		Total	30	1.22	1.00	
	BoP (%)	Control Group	15	34.44	18.32	
		Test Group	15	24.44	10.66	0.07
		Total	30	29.44	15.58	
	GI	Control Group	15	1.23	0.65	
41		Test Group	15	0.97	0.44	0.21
		Total	30	1.10	0.56	
	CAL	Control Group	15	1.22	0.73	
		Test Group	15	1.12	0.79	0.72
		Total	30	1.17	0.75	
	Periotest	Control Group	15	1.03	4.51	
		Test Group	15	0.99	3.00	0.97
		Total	30	1.01	3.76	
	PD	Control Group	15	0.97	0.70	
		Test Group	15	1.14	0.81	0.55
		Total	30	1.06	0.75	
	BoP (%)	Control Group	15	55.55	17.44	
		Test Group	15	22.22	13.60	0.001*
		Total	30	38.88	22.88	
	GI	Control Group	15	1.18	0.54	
31		Test Group	15	1.14	0.53	0.83
		Total	30	1.16	0.53	
	CAL	Control Group	15	0.84	0.79	
		Test Group	15	1.20	0.54	0.15
		Total	30	1.02	0.69	
	Periotest	Control Group	15	0.83	1.93	
		Test Group	15	1.14	6.08	0.85

		Total	30	0.99	4.43	
	PD	Control Group	15	0.72	0.69	
		Test Group	15	1.17	0.79	0.11
		Total	30	0.94	0.76	
	BoP (%)	Control Group	15	36.66	26.87	
		Test Group	15	19.12	23.21	0.07
		Total	30	28.19	26.28	
	GI	Control Group	15	0.99	0.63	
32		Test Group	15	1.34	0.50	0.11
		Total	30	1.16	0.59	
	CAL	Control Group	15	1.29	0.56	
		Test Group	15	1.27	0.60	0.93
		Total	30	1.28	0.57	
	Periotest	Control Group	15	0.59	2.70	
		Test Group	15	0.70	2.65	0.91
		Total	30	0.64	2.63	
Total score OHIP-14		Control Group	15	1.26	8.98	
		Test Group	15	3.46	8.30	0.49
		Total	30	2.36	8.57	

*$p < 0.05$, statistically significantly different

BoP, bleeding on probing; CAL, clinical attachment loss; GI, gingival index; Max, maximum; Min, minimum; PD, probing depth; St. Dev, standard deviation; T0, baseline; T1, Re-evaluation 1 month after initial periodontal treatment.

tooth loss would decrease and this would be reflected in the OHIP-14 scores. However, no statistically significant results were observed in the inter-group evaluation of seven dimensions of OHIP-14. In the intra-group evaluation, a statistically significant difference was observed only in the control group in terms of the median values of the questions representing physical limitations. Accordingly, the increased score of physical limitation in the control group after treatment may be due to the sensitivity that periodontal treatment may cause in the first stage or the discomfort caused by ongoing occlusal contacts during feeding. However, in the inter-group evaluation, OA application in addition to the IPT did not have a sufficient effect on the patient and as a result, it did not make a statistically significant contribution to the quality of life.

The role of OA in periodontal treatment is controversial, and the practicality of performing this procedure is unclear. Hakkarainen et al. (10) investigated the effect of OA on the tooth and reported that the protein content and activity of collagenase in the sulcus fluid were decreased by OA of hypermobile teeth with deep pockets. In another study, same author reported that the decrease in sulcus fluid flow in the group that underwent OA before SRP remained statistically insignificant during the first two-week period and that the quality of sulcus fluid flow was not affected by occlusal interventions (23). Additionally, a systematic review could not provide a definitive conclusion for the OA procedure associated with periodontal treatment, reporting that the application of this form of treatment depends on clinical assessment, the tooth, and the comfort of the patient (24). Burgett et al. (13) investigated whether OA was of greater importance in periodontal defects treated non-surgically. Therefore, they examined the effect of OA on attachment levels, PD and tooth mobility. As a result, this randomized-controlled clinical study with long follow-up reported that OA provided significantly greater clinical attachment gain than non-OA, but had no effect on the response in PD. In addition, Burgett et al. (13) reported that initial tooth mobility or the degree of periodontal disease severity did not affect the response to OA. The results of a review that searched the literature in three electronic databases and examined clinical studies with at least 12 months of follow-up also reported that OA may provide an improvement in the clinical attachment level, but its effect on other periodontal parameters is unclear (5). However, it

has been shown that occlusal therapy increases patient comfort and is an adjunct procedure to periodontal treatment (3). According to the results of our study, IPT had a positive effect on clinical periodontal parameters in both groups at pre-treatment and post-treatment evaluation. However, in the treatment results of the test group to which OA was applied, a significant improvement was observed in the CAL value of only one tooth after one month. The fact that this effect was not seen in the majority of teeth suggests that it may be related to the short follow-up period and tissue reactions, especially in the early healing period of periodontal treatment.

Nonetheless, the findings of this research must be carefully interpreted due to its limitations. Limitations include that it was conducted as a single-center study, the necessity of OA and tooth splinting concept according to the severity of mobility in some teeth, and the short follow-up period due to the study design.

In conclusion, IPT yielded a positive effect on clinical periodontal parameters in periodontitis patients in whom OA was performed, while it had a significant effect on only one tooth in terms of tooth mobility. Also, OA combined with IPT revealed no significant effect on the total OHIP-14 scores. However, longer-term follow-up data are required in a larger patient population to observe the effect of OA on quality of life, periodontal parameters and tooth mobility, and whether to recommend it as an adjunct procedure to IPT.

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