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Evaluation of the Effect of Non-Surgical Periodontal Treatment on Oral Health-Related Quality of Life in Patients with Periodontitis at Different Stages

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Research Article

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ABSTRACT

Objectives: To determine the effect of non-surgical periodontal treatment (NSPT) on oral health-related-quality-of-life (OHRQoL) in individuals with periodontitis at different stages.

Materials and Methods: Full-mouth clinical periodontal parameters [plaque-index (PI), gingival-index (GI), probing-pocket-depth (PD), bleeding-on-probing (BOP), clinical-attachment-loss (CAL)] of 119 healthy individuals aged 24 to 64 years just before and six-weeks after NSPT were obtained and the mean was calculated. Oral hygiene instructions were given. The Oral-Health-Related-Quality-of-Life-United-Kingdom (OHRQoL-UK) scale was used to measure the positive and negative effects of NSPT on OHRQoL. Sociodemographic data (age, gender, education and income status, reason for admission to the hospital, use of toothbrush, other cleaning tools, removable prosthesis and smoking) of the participants were recorded using a multiple choice questionnaire.

Results: The use of toothbrushes and cleaning device increased in all phases after the treatment. Ages of individuals in stage-IV were higher than other stages. Individuals in stage-III and IV had fewer teeth than other stages, while the use of removable prosthesis was higher. Clinical periodontal parameters decreased significantly in all stages after treatment and showed improvement. When all stages before and after treatment were compared within themselves, there were significant differences in the total score of OHRQoL between stages I-III, I-IV, II-III and II-IV. It was observed that all OHRQoL scores increased when compared before and after treatment in terms of symptoms, physical, psychological and social status.

Conclusions: NSPT provides a significant improvement in the OHRQoL of individuals in all stages of periodontitis.

Keywords: Periodontitis, Staging, Quality of Life, Turkiye.

Farklı Evrelerdeki Periodontitis Hastalarında Cerrahi Olmayan Periodontal Tedavinin Ağız Sağlığı ile İlişkili Yaşam Kalitesi Üzerine Etkisinin Değerlendirilmesi

Süreç

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ÖZ

Amaç: Cerrahi olmayan periodontal tedavinin farklı evrelerdeki periodontitis hastalığına sahip bireylerde ağız sağlığı ile ilişkili yaşam kalitesi üzerine olan etkisini belirlemektir.

Gereç ve Yöntemler: Evre I,II,III, ve IV' deki yaş aralığı 24-64 olan toplam 119 sağlıklı bireyin periodontal tedaviden önce ve tedaviden 6 hafta sonra sonra kapsamlı periodontal muayeneleri gerçekleştirildi, oral hjyen eğitimi verildi ve tüm ağız klinik periodontal parametrelerinin [plak indeksi (PI), gingival indeks (GI), cep derinliği (CD), sondlamada kanama (SK), klinik ataçman kaybı (KAK)] ortalaması hesaplandı. Periodontal tedavinin yaşam kalitesi üzerine pozitif ve negatif etkisini ölçmek için, Birleşik Krallık- Ağız Sağlığına İlişkin Yaşam Kalitesi (Oral Health Related Quality of Life-United Kingdom=OHRQoL-UK) ölçeği kullanıldı. Çoktan seçmeli anket formu kullanılarak katılımcıların sosyodemografik verileri (yaş, cinsiyet, eğitim durumu, gelir durumu, hastaneye başvurma nedeni, diş fırçası-yardımcı temizlik aracı- hareketli protez ve sigara kullanımı) kaydedildi.

Bulgular: Diş fırçası ve yardımcı temizlik aracı kullanımı tedavi sonrası tüm evrelerde arttı. Evre IV hastalarının yaşları diğer evrelere göre yüksekti. Evre III ve evre IV'deki hastaların diş sayısı diğer evrelerden daha azdı, hareketli protez kullanımı daha fazlaydı. Klinik periodontal parametreler tedavi sonrasındaki tüm evrelerde anlamlı düzeyde azalarak iyileşme gösterdi. Yaşam kalitesinin toplam skoru tedavi öncesindeki ve tedavi sonrasındaki evreler kendi aralarında kıyaslandığında evre I-III, I-IV, II-III ve II-IV arasında anlamlı farklıydı. Tedavi öncesi ve sonrası kıyaslandığında semptom, fiziksel durum, psikolojik durum ve sosyal durum açısından tüm yaşam kalitesi değerlerinin arttığı gözlenmiştir.

Sonuç: Periodontal tedavi periodontitisin tüm evrelerindeki bireylerin yaşam kalitesinde önemli bir iyileşme sağlamaktadır

Anahtar Kelimeler: Periodontitis, Evreleme, Yaşam Kalitesi, Türkiye.

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Introduction

Periodontitis is a common, chronic, immuno-inflammatory disease that can lead to loss of tooth supporting tissues, slow progressive destruction of alveolar bone, pocket formation or gingival recession.[1] Symptoms of periodontitis include gingival redness, bleeding on brushing, mobility and shifting of the teeth, chewing difficulties, bad breath, unaesthetic appearance, pain, and eventually tooth loss. From the individual's point of view, all of these can be a major oral health problem.[2] Besides its clinical importance, poor oral health causes personal insecurity, leads individuals to social isolation, feelings of guilt and inferiority, and exacerbates or facilitates the emergence of psychiatric and psychosomatic conditions such as depression.[3]

The desired outcome of periodontal treatment is to prevent disease progression by inhibiting inflammatory disease processes and to improve the patient's individual oral health. Non-surgical periodontal therapy (NSPT) reports contradictory results of healing, either significant[4,5] or insignificant.[6,7] The duration of treatment is usually long and its procedures may cause some discomfort. Besides the improvement of traditional-objective clinical parameters such as reduction of inflammation and attachment gains[8], subjective patient-reported findings should be considered as an important endpoint to fully evaluate the efficacy of periodontal therapy.[9] Possible side effects of non-surgical root instrumentation include gingival recession, soft tissue trauma, root hypersensitivity, and pain.[10,11]

Subjectively perceived oral health and its physiological, psychological and social effects on daily life have been named by Locker and Allen as "Oral Health Related Quality of Life" (OH-QoL).[12] OHRQoL defines oral health satisfaction and self-confidence as a multidimensional construct that reflects people's comfort while eating, sleeping and engaging in social relationships. Over the years to evaluate the impact of oral diseases such as periodontitis on OH-QoL; various methods and tools have been developed, including the General (formerly Geriatric) Oral Health Assessment Index (GOHAI)[13], the Oral Health Impact Profile (OHIP)[14], the Oral Health Quality of Life Scale-United Kingdom (OHRQoL-UK)[15] and the Oral Effects on Daily Performance (OIDP)[16]. Some scales focus on the frequency of oral health problems and only record negative aspects of the disease state; that is, the more symptoms there are, the worse the OHRQoL. Among the tools used to measure quality of life, one of the most widely used is the OHRQoL-UK proposed by McGrath and Bedi.[15,17] OHRQoL-UK has a broader approach beyond the absence of disease. It focuses on the impact of oral health on a person's daily life and well-being.[15] Thus, it is a salutogenic approach that focuses on health rather than disease, aiming to report not only the frequency of problems but also the positive effects of oral conditions. The OHRQoL-UK was used to examine the relationship between OHRQoL and periodontal disease with respect to both disease and health status.[10,18,19]

The effect of periodontitis on OHRQoL is well known.[4,18] However, relatively little is known about the impact of mechanical instrumentation at different stages of periodontitis on patient perception and OHRQoL. This study aimed to evaluate OHRQoL before and after NSPT at different stages of periodontitis using OH-QoL-UK.

Materials and Methods

Study Design

This cross-sectional study was conducted in accordance with the 2002 Helsinki Declaration and the "Guidelines for Good Clinical Practice". The purpose and procedure of the study were explained to all volunteers and an informed consent form was signed. The participants of the study were selected among the individuals who applied to the Periodontology Clinic of Tepebaşı Oral and Dental Health Training and Research Hospital between November 2020 and March 2021, taking into account the participation criteria detailed below. The study protocol was approved by the Ethics Committee No.1 of Ankara City Hospital. (Date:11.11.2020 / Decision no:E1/1259/2020).

Selection Criteria

Participation criteria: Inclusion criteria were determined by radiographic examination and full-mouth clinical periodontal evaluation. Systemically healthy individuals with periodontitis who applied to the periodontology clinic were included in the study. The clinical diagnosis and staging of periodontitis was determined according to the “2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions”.[20] Accordingly, patients with interdental radiographic bone loss of ≥2 mm in non-adjacent teeth or with a pocket depth of >3 mm on probing for ≥2 teeth and with 15% buccal or oral radiographic bone loss were diagnosed as periodontitis. Periodontitis is divided into four stages: Stage I (Initial periodontitis), Stage II (Moderate periodontitis), Stage III (Severe periodontitis with the potential for additional tooth loss) and Stage IV (Severe periodontitis with excessive tooth loss and potential for dentition loss) categorized. The staging process was evaluated in terms of severity and complexity. The severity was determined by the worst tooth in the dentition, primarily based on the level of interdental clinical attachment loss. Attachment loss due to periodontitis was scored as 1-2 mm for Stage I, 3-4 mm for Stage II, and ≥5 mm for Stage III and IV. The determining factor for the differentiation of Stage III and IV was the number of teeth lost due to periodontitis; Stage III: ≤4 teeth and Stage IV: ≥5. The presence of even one complexity factor (The presence of vertical defects, furcation involvement, excessive tooth mobility, tooth displacement or loss, loss of alveolar crest and chewing function) pushed the diagnosis to a higher stage. All periodontitis patients were generalized periodontitis patients with more than 30% teeth affected in terms of generality.

Exclusion criteria: Patients with systemic disease that may affect periodontal tissues (diabetes, rheumatoid arthritis, cardiovascular), patients who have used drugs (antibiotics, anti-inflammatory, calcium channel blockers) or received periodontal treatment that may affect the gingiva in the last six months, patients with active infectious diseases (AIDS, HBV, tuberculosis), pregnant and lactating women were not included in the study.

Clinical Measurements and Data Collection

Periodontal examination of a total of 119 participants was performed by a periodontologist (M.A.T.) with a periodontal probe (Williams' probe, Hu-Friedy, Chicago, IL). All clinical periodontal parameters of patients, such as number of teeth, whole mouth plaque index (PI), gingival index (GI), bleeding on probing (BOP), pocket depth on probing (PD), and clinical attachment loss (CAL) were measured before and after NSPT and recorded.

A total of five volunteers were evaluated twice, with a one-hour break, to ensure the investigator's intra-observer calibration. Blinding was provided between the first and second measurements. A repeatability of at least 85% with a mean difference of 1 mm was obtained. Six regions of each tooth (mesiobuccal, buccal, distobuccal, mesiolingual, lingual and distolingual) were evaluated by accepting the cementoenamel junction as the reference point. When calculating the whole mouth PI, GI, PD and CAL, the sum of the values was divided by the total number of regions. BOP was calculated as the % number of regions with (+). Values in mm were rounded to the nearest mm.

Information about the sociodemographic data and socioeconomic status of the participants was collected using a questionnaire containing 9 multiple-choice questions. This questionnaire included questions about age, gender, educational status, income, reason for admission to the hospital, frequency of brushing, use of supportive cleaning tools (floss and interdental brush), use of removable prosthesis, and smoking.

To measure the positive and negative effects of periodontal disease and NSPT on OHRQoL, the OHRQoL-UK scale which includes 16 questions in 4 different categories (symptom, physical condition, psychological state, social status) and was first developed in England in 2000 was used. According to this scale, “How do your teeth, gums, mouth or prosthesis affect your symptom, physical condition, psychological state and social status?” the question was asked. The categories of the scale are respectively; 2 questions about symptoms (comfort, breath), 5 questions about physical condition (nutrition, appearance, general health, speech, smile), 5 questions about psychological status (relaxation/sleeping, confidence, mood, carefree/calmness, personality), 4 questions about social status (social life, private life with partner and friend, work/daily life, economic situation). The scored questions were rated on a scale of 1 to 5 (very bad:1, bad: 2, no effect: 3, good: 4, very good: 5). The sum of the scores of the 16 questions is the lowest 16 and the highest 80. A low score indicates a low OHRQoL.

Non-Surgical Periodontal Treatment

Full-mouth scaling and root planning (SCRP) was applied to the participants. The treatment protocol was performed in two sessions in a 24-hour period using ultrasonic instruments (Cavitron DENTSPLY, York, PA.) and hand tools to complete the entire SCRP. No time limit was set for the procedure sessions. The process was terminated when the root surfaces were satisfactorily cleaned and smoothed. Patients were given standard dental hygiene training (brushing, interdental brushing, flossing, tongue brushing) immediately after the first SCRP procedure and warned not to use any medication or mouthwash. During six weeks after the treatment, the patients were called two or three times and checked for compliance with the hygiene instructions given.

Statistical Analysis

Statistical analyzes were performed using software called Statistical Package for Social Sciences (SPSS) version 20 for Windows (SPSS Inc., St. Louis, MO). Shapiro-Wilk or Kolmogrov Smirnov test was used for normality analysis of the data. To compare groups, t-test and/or Mann-Whitney U-test for non-parametric continuous variables in independent samples and chi-square or Fisher's exact tests were used in accordance with categorical variables. Chi-square test was used for frequency data and Kruskal Wallis test was used for ordinal data in comparison of more than two groups. Results were expressed as the median (IQR) (minimum-maximum) for continuous variables in addition to percentage and frequency distribution for categorical variables. The t-test was used to compare two groups with parametric continuous variables in independent samples, and the ANOVA test was used to compare more than two groups. Parametric tests for comparison of dependent groups; paired t-test for comparison of two groups; ANOVA test was used for repeated measures in the comparison of more than two groups. Results were expressed as mean± standard deviation (SD). $p<0.05$ was determined as statistically significant. Before beginning the study a power calculation was performed to detect a significant difference in effect sizes between groups using the GPower 3.1.9.4 program. At least 27 patients per group were calculated to have 80% power at an effect size of 0.8 and a = 0.05 for the bilateral test.

Results

The age range of 119 individuals participating in the study was 24-64, and the mean age was 44.24 (±10.68). There was no statistically significant difference in age between stages I,II and III ($p>0.05$), but the patients in stage IV were older than the other stages ($p<0.05$). There was no statistically significant difference between the stages in terms of gender and income status ($p>0.05$), but there was a significant difference in terms of the reason for admission to the hospital ($p<0.05$). There was no difference between stage I and II in terms of the number of existing teeth ($p= 0.828$), and there were statistically

significantly fewer teeth in stage III and IV (p=0.00) compared to other stages (Table 1).

There was no significant difference between the stages in terms of smoking (p>0.05). The use of removable prosthesis was significantly higher in stages III and IV compared to other stages (p<0.05). There was no significant difference between the stages before and after the treatment in terms of the use of toothbrush and supportive cleaning device (p>0.05), but it increased significantly in all stages after treatment compared to pre-treatment (p<0.01) (Table 2).

The measurements of clinical periodontal parameters before and after treatment are shown in Table 3. Accordingly, there was a significant difference between the stages (p<0.01) before and after the treatment in terms of PD and CAL, except for stage III and IV (p>0.05). It was observed that PD and CAL values before and after treatment increased as the severity of the stage increased and reached the highest value in stages III and IV. In terms of GI values, before treatment; stage I was significantly higher than stage IV (p<0.05), there was no significant difference between other stages. (p>0.05). After the treatment, there was no significant difference between the stages in terms of GI values (p>0.05). In terms of PI, there was no significant difference between the stages before and after the treatment (p>0.05). In terms of BOP, there was a significant difference between stages I-II, I-III and I-IV before treatment (p<0.05). There was a significant difference between stage I-III, I-IV, II-III and II-IV after treatment (p<0.05). It was observed that the BOP value in stages III and IV was higher than in stages I and II (p<0.01). All clinical periodontal parameters (PD, CAL, GI, PI, BOP) showed significant improvement after treatment compared to before treatment in all stages (p<0.01) (Table 3).

Table 1. Sociodemographic data of periodontitis patients at different stages

		Evre 1 (n:31)	Evre 2 (n:30)	Evre 3 (n:29)	Evre 4 (n:29)	p
% Gender	Female	%28.1	%24.6	%22.8	%24.6	0.896 $^{X^2}$
	Male	%24.4	%25.8	%25.8	%24.2	
% Age	Median	43 (16)	40.5 (20)	48 (15.5)	54 (12.5)	0.00 ^{K}
	(Min-Max)	(25-56)	(24-59)	(25-56)	(34-64)	
% Education level	Primary education	%32.3	%23.3	%51.7	%69	0.00 $^{X^2}$
	High school	%45.2	%60	%37.9	%31	
	University	%22.6	%16.7	%10.3	%0	
% Income status	Below minimum-wage	%35.5	%46.7	%51.7	%41.4	0.253 $^{X^2}$
	Above minimum-wage	%32.3	%33.3	%31	%34.5	
	Twice the minimum-wage	%22.6	%16.7	%13.8	%24.1	
	More than twice	%9.7	%3.3	%3.4	%0	
% Reason for admission to hospital	Gum problem	%45.2	%56.7	%58	%27.6	0.042 $^{X^2}$
	Dental problem	%29	%23.3	%20.7	%31	
	Prosthetic problem	%12.9	%13.3	%10.3	%27.6	
	Routine control	%12.9	%6.7	%10.3	%13.8	
Number of teeth	Median	26(3)	26(2)	22(3.3)	17(3)	0.00 ^{K}
	(Min-Max)	(23-30)	(23-28)	(18-27)	13-19)	

^{K} Kruskal-wallis / $^{X^2}$ chi-squared test. P<0.05 is statistically significant.

Table 2. Smoking and use of removable prosthesis in periodontitis patients at different stages. Oral hygiene habits before and after treatment

		Stage I (n:31)	Stage II (n:30)	Stage III (n:29)	Stage IV (n:29)	p
% Smoking	None	%51.6	%50	%41.4	%37.9	0.496 $^{X^2}$
	Less than 10 pieces per day	%29	%33.3	%37.9	%34.5	
	1 pack per day	%19.4	%3.3	%20.7	%24.1	
	More than 1 pack per day	%0	%3.3	%0	%3.4	
% Use of removable prosthesis		%6.5	%3.3	%17.2	%65.5	0.00 $^{X^2}$
% Use of toothbrush (pre-treatment / post-treatment)	None	%19.4/ 0	%13.3/ 0	%13.8/0	%17.2/0	0.957/0.909 $^{X^2}$
	Irregular brushing	%35.5/ 0	%33.3/ 0	%37.9/0	%24.1/0	
	Once a day	%19.4/29	%26.7/33.3	%20.7/37.9	%34.5/34.5	*0.00 $^{X^2}$
	Twice a day	%25.8/71	%26.7/66.7	%27.6/62.1	%24.1/65.5	
% Use of supportive cleaning tools (floss and interdental brush) (pre-treatment / post-treatment)	None	%80.6/35.5	%73.3/36.7	%86.2/34.5	%75.9/31	0.935/ 0.986 $^{X^2}$
	Once a day	%9.7/35.5	%13.3/33.3	%6.9/41.4	%10.3/34.5	
	Several times a week	%9.7/29	%13.3/30	%6.9/24.1	%13.8/34.5	*0.00 $^{X^2}$

$^{X^2}$ chi-squared test. *p value before/after treatment. P<0.05 is statistically significant.

Table 3. Clinical periodontal parameters of periodontitis patients at different stages before and after treatment

	Stage I (n:31)	Stage II (n:30)	Stage III (n:29)	Stage IV (n:29)	p	p (Pre.T/Post.T)
PD (mm)						
Pre-Treatment	3.2(0.4)	3.8(0.33)	4.8(0.5)	4.9(0.35)	0.00[K]. (0.00[a]/0.068[b])*	0.00**
Post-Treatment	2(0.3)	2.6(0.5)	3.5(0.5)	3.5(0.4)	0.00[K]. (0.00[a]/0.590[b])*	
CAL (mm)						
Pre-Treatment	3.2(0.4)	3.85(0.4)	4.9(0.5)	5(0.35)	0.00[K]. (0.00[a]/0.120[b])*	0.00**
Post-Treatment	3(0.4)	3.55(0.43)	4.5(0.65)	4.7(0.35)	0.00[K]. (0.00[a]/0.479[b])*	
GI						
Pre-Treatment	1.8(0.4)	1.65(0.43)	1.7(0.4)	1.6(0.3)	0.04[K]. (0.004[c])*	0.00**
Post-Treatment	0.8(0.3)	0.9(0.4)	0.8(0.4)	0.8(0.4)	0.697[K]	
PI						
Pre-Treatment	1.3(0.5)	1.5(0.43)	1.5(0.55)	1.4(0.2)	0.467[K]	0.00**
Post-Treatment	0.6(0.2)	0.75(0.33)	0.6(0.4)	0.6(0.35)	0.281[K]	
BOP (%)	77.19±7.04	81.66±8.14	81.86±7.14	83.83±7.39	0.007[λ]	
Pre-Treatment	(65-92)	(68-97)	(69-94)	(68-97)	(0.025[d]. 0.014[e]. 0.001[f])[t]	0.00[t]
Post-Treatment	7.64±3.03	9.17±3.14	26.41±5.02	29.10±5.31	0.030[λ]	
	(6-15)	(7-17)	(18-36)	(20-38)	(0.00[g])[t]	

[K] Kruskal-wallis/ *Mann-whitney u test/ [λ]Anova/ [t]T-test/ **Wilcoxon Signed Test. BOP: Bleeding on probing. PI: Plaque index. GI: Gingival index. PD: Probing Pocket depth, CAL: Clinical attachment loss. p<0.05 is statistically significant.
[a]There is a significant difference between Stage I-II, Stage I-III, Stage I-IV, Stage II-III, Stage II-IV. [b]There is no difference between Stage III-IV. [c]There is a significant difference between Stages I-IV. There is a significant difference between [d]Stage I-II, [e]Stage I-III, [f]Stage I-IV. [g] There is a significant difference between Stage I-III, Stage I-IV, Stage II-III, Stage II-IV.

The parameters evaluated in the pre- and post-treatment questionnaire to evaluate OHRQoL are summarized in Table 4. Accordingly, when the total scores of the patients in all stages were evaluated before the treatment, there was a significant difference between stages I-III, I-IV, II-III and II-IV (p<0.05). After the treatment, when the total scores of all stages were evaluated, there was a significant difference between stages I-III, I-IV, II-III and II-IV (p<0.05). When compared before and after treatment, it was observed that OHRQoL values increased in terms of symptoms, physical condition, psychological status and social status (p<0.01) (Table 4).

Table 4. Evaluation of oral health-related quality of life before and after treatment in periodontitis patients at different stages

	Stage I (n:31)	Stage II (n:30)	Stage III (n:29)	Stage IV (n:29)	p	p (Pre.T/Post.T)
Symptom (2 questions)						
Pre-Treatment	4(1)	4(1)	3(1)	3(1)	0.000[K]. (0.010[a]. 0.000[b]. 0.005[d])*	0.00**
Post-Treatment	7(1)	7(1.25)	7(2)	6(2)	0.001[K]. (0.006[a]. 0.005[d])*	
Physical Condition (5 questions)						
Pre-Treatment	10(2)	10(2)	10(1)	9(1)	0.008[K]. (0.011[a]. 0.009[b]. 0.029[c].0.022[d])*	0.00**
Post-Treatment	17(2)	17(2)	16(1.5)	16(1)	0.010[K]. (0.004[a]. 0.008[b])*	
Psychological Status (5 questions)						
Pre-Treatment	11(1)	11(1)	10(1)	10(1)	0.029[K]. (0.032[b]. 0.048[c]. 0.012[d])*	0.00**
Post-Treatment	18(1)	17(1.25)	17(1)	17(1)	0.001[K]. (0.001[a]. 0.002[b]. 0.021[c]. 0.033[d])*	
Social Status (4 questions)						
Pre-Treatment	10(1)	10(1.25)	10(1)	10(1)	0.08[K]. (0.042[a]. 0.047[c])*	0.00**
Post-Treatment	13(1)	14(2)	13(1)	13(1)	0.092[K]. (0.05[b]. 0.019[d])*	
Total (16 questions)						
Pre-Treatment	34(3)	35(3)	33(1.5)	32(3)	0.000[K]. (0.000[a.b.d]. 0.001[c])*	0.00**
Post-Treatment	55(3)	54(4.25)	53(3.5)	53(3.5)	0.000[K]. (0.014[a]. 0.000[b]. 0.003[d])*	

[K] Kruskal-wallis/*Mann-whitney u test/** Wilcoxon Signed Ranks Test.
There is a significant difference between [a]Stage I-III, [b]Stage I-IV, [c]Stage II-III, [d]Stage II-IV. p<0.05 is statistically significant.

Discussion

In this study, the change in OHRQoL was examined using the OHRQoL-UK questionnaire before and after NSPT in periodontitis patients and it was shown that periodontitis has a significant effect on OHRQoL. The results of this study were in agreement with the studies showing worse OHRQoL in periodontal disease.[4,19,21-24] Unlike other OHRQoL scales, the OHQoL-UK questionnaire used in this study measures the positive and negative effects of oral health based on the revised model of The World Health Organization.[25,26] It has good psychometric

property, validity and reliability.[27] It has been shown to be sensitive to short- and long-term clinical changes, observed clinical periodontal health, and self-reported oral health after treatment.[18] Negative effects of OHRQoL are expressed as values <48.0, positive effects as values >48.0, and 48 shows no effect. Mumcu *et al.*[28] also found a significant relationship between OHIP-14 and OHRQoL-UK scores.

In this study, mean OHRQoL scores in periodontitis patients at different stages were in the range of 32-35 before treatment and increased to 53-55 after treatment, which was similar to other studies that showed significant improvement.[4,21,22,29] The pretreatment scores of our study were lower than those of Aslund *et al.*[10], who had an average pre-treatment score of 46, and Needleman *et al.*[18], who had a mean pre-treatment score of 47, performed on individuals with mild to moderate periodontitis. Some researchers also found weak correlations between gingival status and OHRQoL.[30,31] These differences may be related to the methodology of the studies, population size, socio-economic status and lifestyle of the participants.

Al Habashnneh *et al.*[23] reported that severe and moderate periodontal diseases have a negative effect on OHRQoL. In our study, when the total OHRQoL was evaluated, there was a significant difference in recovery both before and after treatment in patients with more severe stages (stage III-IV) compared to patients with less severe stages (stage I-II). This result is consistent with previous studies showing that the severity of periodontitis affects the improvement in OHRQoL. [2,18] Eltaş and Uslu[32] found a similarly significant relationship between OHRQoL and disease severity. These results are comparable to studies showing greater improvement in more severe patients.[4,5]

In this study, it was stated that before the treatment, individuals with severe periodontitis (stage III-IV) were significantly negatively affected in terms of physiological status (smile, appearance, speech and nutritional performance) compared to individuals with low severity disease (stage I-II), and they also reported that their general health was badly affected. It was observed that the OHRQoL increased significantly in all stages in terms of physiological status after NSPT, but the stage I periodontitis group reported significantly higher OHRQoL compared to the severe groups (stage III-IV). And they noted that individuals with severe periodontitis (stage III-IV) had a significantly worse OHRQoL in terms of psychological status (mood, confidence, carefree-comfort, sleep patterns and personality) after NSPT than individuals with low-severity periodontitis (stage I-II). When all stages after treatment were compared within themselves, the OHRQoL increased significantly compared to before treatment. It is seen that OHRQoL is scored less in severe stages in terms of social life, family, friends and work relations both before and after treatment. In this study, the changes in the perception of OHRQoL between the stages were small but statistically significant. This can be explained by the fact that severe periodontitis groups are more severe in terms of pain, tooth mobility, loss of interdental papillae, probing depth and gingival bleeding[21], and sometimes NSPT may be insufficient in severe stages. In addition, the number of existing teeth in severe periodontitis groups was significantly less, and stage IV patients showed high prosthesis problems as the reason for admission to the hospital. For these patients, NSPT may not be expected to affect all aspects of OHRQoL because good prosthetic treatment may be required for chewing and biting. However, NSPT positively affected the OHRQoL of the participants. Improvement in both clinical parameters and OHRQoL was observed at all stages after NSPT, and this result is also supported by the long-term study performed previously.[33]

Chewing, swallowing and smile aesthetics of the individual are adversely affected due to clinical findings of periodontitis such as redness, bleeding on brushing, gingival recession, mobility of teeth and tooth loss. As a result, the self-confidence and OHRQoL of the individual decreases.[34] However, periodontitis is a complex disease and it may be wrong to evaluate the results from a single perspective. Because the condition after the treatment can be accepted as improved in one respect and worsened in the other. Although improvement is expected in the clinical findings of periodontitis after NSPT; it has other inevitable findings such as cervical tooth sensitivity, gingival recession, pathologically displaced teeth and loss of interdental papillae. These results can have a psychosocial impact as well as affect appearance and comfort. In addition, in this study, it can be said that surgical periodontal treatment is needed in some regions, since BOP levels could not be reduced to levels considered healthy (<10%) after treatment in severe stages.

In this study, the changes observed in clinical parameters after NSPT were statistically significant and consistent with previously reported clinical studies.[10,35] Clinical improvements were observed by evaluating the objective signs of changes in periodontal status following NSPT. After the treatment, BOP values decreased to 10% levels in stages I and II, as it should be in healthy individuals, while it remained at the level of 20-35% in stages III and IV. Similarly, PD scores were found to be significantly higher due to the increase in disease severity both before and after treatment. According to this result, the need for surgical treatment in severe periodontitis in areas where the expected reduction in BOP and PD does not occur with NSPT is also supported by previous studies.[35] The recovery after treatment found in this study, which is also consistent with previous findings[22], is both clinically significant and can be considered significant for patients.[22] However, if the functionality of the tooth is not maintained for life, improvement of clinical parameters alone may not be sufficient. A trend has emerged that demands a shift towards patient-satisfied approaches in evaluating treatment outcomes. The ultimate goal of physicians is to improve the well-being and OHRQoL of patients.

Conclusions

In conclusion, according to this short-term cross-sectional study, the OHRQoL of individuals with periodontitis at different stages was adversely affected in many ways. Although the post-treatment evaluation period of this study was short; It has been clearly demonstrated that NSPT has a constructive role in improving the impact on OHRQoL. Because the ranges of changes are small, there may be minor undetectable differences between stages. These data may be valuable in determining sample size in future studies. It should be emphasized that there is a significant difference between stages I-II which represents initial and moderate periodontitis, and stages III-IV which represents severe periodontitis with tooth loss and the potential for additional tooth loss. Further long-term studies are needed to evaluate the effect of different dental treatments on OHRQoL and to evaluate these changes clinically.

Conflicts of Interest

No financial support was received for the current study. The authors declare no conflict of interest.

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