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# Evaluation of patients' perception of gingival recession, its impact on oral health-related quality of life, and acceptance of treatment plan

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**ABSTRACT**

**Objective:** Gingival recessions (GR) may cause aesthetic and hypersensitivity complaints which might affect oral health-related quality of life (OHRQoL). The aim of this study was to evaluate the patients' awareness of their own GR, the impact of GR on OHRQoL and the acceptance of suggested treatment modalities.

**Materials and Methods:** This cross-sectional study was conducted with 205 patients. The demographic variables were recorded and patients' perception of GR was questioned. Full-mouth examination was carried out and clinical parameters were recorded. Gingival recessions, GR related complaints were evaluated and GR treatments were suggested and acceptance were also recorded by the examiner. The patients filled out OHRQoL-United Kingdom (OHRQoL-UK) questionnaire regarding to their GR and were asked if GR have/would have impact on oral health and if the GR will/would get worsen. Data was analysed with independent t test and Mann–Whitney *U* test.

**Results:** 4819 teeth were evaluated and 733 GR examined in 147 patients. Fifty-seven patients were unaware of their GR. A strong belief that GR have impact on oral health (88.78%) and GR will progress (86.34%) was detected. Acceptance of treatment was increased and non-invasive modalities were preferred if patients had complaints. The awareness of GR status increases and the misperception decreases the OHRQoL-UK scores. The results revealed that hypersensitivity decreases the OHRQoL-UK scores and aesthetic concerns and hypersensitivity decreases the OHRQoL-UK physical scores significantly ($p < .05$).

**Conclusions:** The results indicated that the patients might be unaware of their GR and the GR related factors may lead to poorer OHRQoL.

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## Introduction

Gingival recession is characterized by the exposure of the root surface through apical migration of the gingival margin beyond the cemento-enamel junction [1]. It is a frequent clinical condition that may be localized or generalized in different socioeconomic populations with high or poor standards of oral hygiene [2,3]. This fact suggests that the aetiology is complex and multifactorial [4]. Gingival recession affects more than 50% of the population with or without presenting any symptoms [3]. A survey in Turkey reported that more than 78% of the population is affected by gingival recession, with males being more susceptible [5].

The apical migration of gingival margin levels may cause thermal and tactile sensitivity, aesthetic concerns, and tendency towards root caries and tooth loss in the worst case scenario [6,7]. However, most patients may not be aware of the recessions, as they are often asymptomatic.

The treatment of gingival recessions aims to not only rehabilitate the aesthetic appearance of the gingival margins but also eliminate the symptoms of the recession itself. Treatment options include the interdisciplinary approach of periodontal surgery, orthodontic, and restorative techniques [8,9]. Cervical hypersensitivity is the most frequent consequence of gingival recession. Cervical dentine hypersensitivity treatment objectives are to occlude dentinal tubule systems and/or block neural transmission by pulp [10] using lasers, ions, oxalates, and dentinal sealants [11,12].

The periodontal literature has limited publications on the perception and acceptance of treatment modalities of gingival recessions because these concepts have been underestimated [13,14]. In 2013, Nieri et al. [13] reported on patient perceptions of buccal gingival recessions and requests for treatment, stating that concerns about aesthetics and physical symptoms, like hypersensitivity, increase patient perception and acceptance of surgical/non-surgical treatment programmes.

Oral health-related quality of life (OHRQoL) shifts the focus of clinicians and researchers from the oral cavity and the traditional medical/dental factors to the patient as a whole [15]. It can be measured using a standardized validated questionnaire approach [16]. This questionnaire may help clinicians understand patients' subjective evaluation and identify patients' needs and expectations, generate tailored treatment modalities, and follow up patient progress from

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patients' perspectives [17]. Thus, the clinician gains a new perspective in clinical care and research. One of the most used OHRQoL instruments is OHRQoL-United Kingdom (OHRQoL-UK) [18], which incorporate the negative and positive influences on health and is based on the WHO model of structure–function–ability–participation [19].

Concerns on gingival recession may impair individuals' OHRQoL, as new functions and habits need to be adopted to avoid symptoms. To the authors' knowledge, the literature is lacking in evaluating the impact of gingival recession on OHRQoL. Thus, the aim of this cross-sectional study was to evaluate patients' perception of gingival recession, acceptance of treatment plan, and its impact on patients' perspective of their OHRQoL. The tested null hypotheses were as follows: 1. Participants are aware of their own gingival status, 2. Gingival recession has no impact on oral health and OHRQoL, 3. Participants who had gingival recession accept the proposed treatment modalities.

## Materials and methods

The reporting of this study conforms to the STROBE statement [20]. This study was approved by Başkent University Institutional Review Board and Ethics Committee (Project No: D-KA15/15) and conducted between May and August 2015.

The participants were recruited from individuals referred to the Department of Periodontology at Başkent University Faculty of Dentistry. Statistical power analysis was employed to determine the study size [21]. Considering $\alpha = 0.05$ and power 90%, 120 participants were necessary for the study [13]. The participants were informed of the purpose of the study, and written informed consent was obtained from all participants. The eligibility criteria were as follows: 1) age $\geq$18 years; 2) no communication and/or cooperation difficulties; 3) number of teeth $\geq$ 10; 4) not having any periodontal treatment within the last six months. The exclusion criteria were the use of orthodontic appliances and any mental or physical disability barring the performance of oral hygiene procedures.

The demographic variables, frequency of dental visit, and oral hygiene habits and attitudes, and awareness and the impact of gingival recessions were obtained by a questionnaire that was filled out solely by the participants before dental examination. The participants were asked if they had any gingival margin discrepancies/gingival recession in any of their teeth (yes/no). The participants were also asked regarding their perceptions, as follows: if he/she has/would have any gingival recessions, 1) will/would these gingival recessions have/would have an impact on their oral health (yes/no) and 2) will/would these gingival recessions get worse/progress (yes/no) in time.

The participants' age (A1: 18–40; A2: 41–60; A3: 61–75), educational level (E1: elementary; E2:secondary; E3: high-school; E4: university), dental visit frequency (DVF1: every 6 months; DVF2: annually; DVF3: when have complaint), tooth brushing frequency (BF1: not regularly; BF2: once a day; BF3: twice a day; BF4: at least three times in a day), technique (BTe1: horizontal; BTe2: vertical; BTe3: rolling) and duration (BD1: less than a minute; BD2: between 1 to 2 min; BD3: more than 2 min), the preferred bristle type (BT1: soft; BT2: medium; BT3: hard; BT4: no particular preference) and interproximal cleaning habits (everyday regularly, and no interproximal cleaning) were sub-grouped to evaluate their possible effects on patients' gingival recession perception.

The participants were asked to fill out the OHRQoL-UK questionnaire with respect to gingival recession before the clinical evaluation. The questionnaire consists of 16 items for four domains: two for symptoms, five for physical status, five for psychological status, and four for social status. The responses were recorded on a five-point Likert scale ranging from none to extreme impact: 1, very bad effect; 2, bad effect; 3, no effect; 4, good effect; 5, very good effect. Individual item responses were summed to generate scores separately for each of the four domains and to generate an overall OHRQoL-UK score, with possible overall scores ranging from 16 to 144. Lower scores indicated poorer oral health status [19].

All questionnaires were self completed by the patients in waiting room before clinical evaluation. The patients were then invited to dental examination room and the perception of gingival recessions was evaluated with the participants. The participants who replied yes to having gingival recessions were given a mirror and then requested to locate their gingival recessions. The numbers of declared recessions and misperception of gingival recessions by the participants were recorded.

All participants were evaluated by one examiner; all gingival recessions and non-carious cervical lesions were recorded. If any gingival recessions had examined, the possible existence of non-carious cervical lesions were evaluated by a dental explorer. If the participants had any gingival recessions, they were informed of the same; the recessions were presented to them with the aid of a mirror. The aetiology of the existing gingival recessions was explained. Participants presenting gingival recession were re-evaluated in terms of aesthetic concerns and/or having dental hypersensitivity to plan a treatment strategy. Each participant received a clinical assessment of an air-blast hypersensitivity test along with tactile examination. Response to the stimulus was recorded (0, no sensitivity; 1, sensitive).

The treatment plan of each participant was tailored with respect to his/her periodontal status. It included either periodontal surgery or restorative/hypersensitivity treatment. The acceptance of the treatment plan by the participants was recorded (1, yes; 2, no). Periodontal surgery treatment plans involved root coverage techniques and the operations to increase the width of attached gingiva. Restorative treatment options were recommended to participants presenting non-carious cervical lesions, hypersensitivity, and aesthetic concerns, and if the surgery cannot be predicted to cover the defective site satisfactorily. These options included direct restorations and/or application of hypersensitivity agents.

The clinical periodontal parameters were recorded by one examiner after the evaluation of gingival recessions. The clinical parameters were as follows: 1) probing pocket depth (PPD), referring to the distance from gingival margin to the

bottom of the gingival sulcus that measured at six aspects per tooth using a Williams periodontal probe[1]; 2) gingival recession depth (GRD), the distance from gingival margin and cemento-enamel junction (CEJ) that measured at mesio-buccal, mid-buccal, and disto-buccal aspects of each tooth; 3) gingival recession width (GRW), the widest distance of the recession between the mesial and distal gingival margins of the tooth measured on a horizontal line parallel to the CEJ; 4) width of keratinized gingiva (WKG), the distance from the gingival margin to the muco-gingival junction at recession sites; 5) full mouth plaque score (FMPS), the percentage of total surfaces with plaque presence recorded as full mouth plaque score [22]; and 6) full mouth bleeding score (FMBS), the percentage of total surfaces that bled upon probing recorded as full mouth sulcus bleeding score [23]. The presence of plaque and bleeding on probing was evaluated at four aspects per tooth (at mesio-buccal, mid-buccal, disto-buccal, and mid-lingual/mid-palatinal surfaces). The examiner had been previously calibrated for intra-examiner repeatability of measurements, and the obtained intra-class correlation coefficient was 0.96.

### Statistical analysis

The collected data were analysed using SPSS version 22.0.[2] One-way analysis of variance was used to determine the differences between the groups. Intergroup comparisons of continuous variables were performed using independent *t*-tests. For the comparison of intergroup nonparametric independent samples, the Mann–Whitney–U test was applied. Pearson's correlation coefficient (r) was utilized to evaluate the correlation between variables. Quantitative variables were reported as mean and standard deviation (mean ± SD). The significance level was determined as $p < .05$.

## Results

The study was conducted with 220 participants, of whom 10 were excluded: five had current orthodontic treatment, three had received periodontal therapy in the last six months, and two had serious systemic disease. Meanwhile, five patients did not accept to be enrolled in the study.

A total of 205 participants (mean age of 39.34 ± 11.78 years) and 4,819 teeth were evaluated; 147 patients had gingival recessions on 733 teeth. The participants' demographic characteristics, educational status, and oral hygiene habits and attitudes are shown in Table 1. Of the 104 participants who declared having gingival recession, no actual gingival recessions were observed in 14 (misperception of having gingival recession, $n = 14$; perception of gingival recession, $n = 90$). A total of 44 participants had the awareness of having no gingival recession (perception of no gingival recession, $n = 44$), whereas 57 were not aware of their gingival recession (misperception of not having gingival recession, $n = 57$).

The results revealed that among 205 participants, 71 participants (34.6%) had a misperception of the presence of gingival recession [57 out of 147 (38.8%) had gingival recession but were unaware, and 14 out of 58 (24.1%) did not have gingival recession but think they had; Table 1].

Participants' gender seemed to have an effect on perception of gingival recession. Female patients' total misperception was significantly higher than male patients' ($p < .05$; Table 1). Total misperception participants within the age range of 41–60 was significantly low compared to other age range groups' misperception ($p < .05$). An inclining pattern of misperception with decreased education level was observed except the secondary school graduated participants which had the least number of patients ($n = 15$). The misperception of elementary school graduated participants was significantly higher than secondary and university graduated participants ($p < .05$; Table 1). It was observed that as the dental visit frequency decreased, misperception of gingival recession increased. The participants who had annually dental visits had significantly lower misperception than the participants who had irregular dental visits depending on the dental complaints ($p < .05$). Patients who had the brushing frequency of twice a day, had significantly higher awareness of gingival recession than the patients who brushed once a day ($p < .05$). The participants using vertical brushing technique had significantly lower misperception compared to patients using the rolling technique ($p < .05$; Table 1). The patients with brushing duration of more than 2 min had significantly higher misperception compared to patients with brushing duration of 1 to 2 min ($p < .05$). The patients preferring tooth brushes with medium bristles had significantly higher perception compared to hard bristled brush users ($p < .05$). The participants, who had not have interproximal cleaning habits, had lower misperception of gingival recession however significant difference was not observed ($p > .05$; Table 1).

The participants' periodontal parameters with respect to perception of gingival recession are given in Table 2. The increase in the level of gingival recession depth was related to increased perception of the presence of gingival recession ($p = .023$; $p < .05$).

A total of 188 non-carious cervical lesions were detected among 68 of 205 participants. The numbers of lesions are presented in Table 3. Among the participants, 177 (86.34%) believed that the gingival recessions will/would progress in time, whereas 182 (88.78%) declared that gingival recessions have/would have a negative impact on their oral health (Table 3).

Table 4 presents the OHRQoL scores with respect to participants' perception of gingival recession and the OHRQoL-UK total scores related to the responses regarding gingival recessions' progression and impact on oral health. The results showed statistically significant differences between the participants who were unaware of their gingival recessions and those who did not have any gingival recession and were aware of this situation with respect to OHRQoL-UK symptom, physical, psychological, social, and total scores ($p < .05$). Thus, perception of awareness increased whereas misperception decreased the OHRQoL-UK scores. When the participants who were aware of their gingival recession were evaluated with respect to the impact of gingival recession on their oral health, a statistically significant difference was

**Table 1.** Demographic characteristics and patients' perception of gingival recession with respect to gender, age, educational status, oral hygiene habits and attitudes.

| | | Gingival recession present $n = 147$ | | | No gingival recession $n = 58$ | | | |
|---|---|---|---|---|---|---|---|---|
| | n | Perceived[a] $n = 90$ | Unperceived[b] $n = 57$ | Misperception (%) | Perceived[c] $n = 44$ | Unperceived[d] $n = 14$ | Misperception (%) | Total misperception |
| Gender | | | | | | | | |
| Male | 74 | 33 | 21 | 38.9 | 18 | 2 | 10 | 31.1 |
| Female | 131 | 57 | 36 | 38.7 | 26 | 12 | 31.6 | 36.6 |
| Age | | | | | | | | |
| A1 | 108 | 34 | 29 | 46 | 34 | 11 | 24.4 | 37 |
| A2 | 85 | 50 | 22 | 30.5 | 10 | 3 | 23.1 | 29.4 |
| A3 | 12 | 6 | 6 | 50 | 0 | 0 | 0 | 50 |
| Education level | | | | | | | | |
| E1 | 27 | 13 | 12 | 48 | 1 | 1 | 50 | 48.1 |
| E2 | 15 | 10 | 3 | 23.1 | 1 | 1 | 50 | 26.7 |
| E3 | 44 | 21 | 14 | 40 | 7 | 4 | 36.3 | 41 |
| E4 | 119 | 46 | 30 | 39.5 | 35 | 8 | 18.6 | 32 |
| Dental visit frequency | | | | | | | | |
| DVF1 | 35 | 14 | 8 | 36.4 | 10 | 3 | 23.1 | 31.4 |
| DVF2 | 38 | 15 | 8 | 34.8 | 12 | 3 | 20 | 29 |
| DVF3 | 132 | 61 | 41 | 39 | 22 | 8 | 26.7 | 37.1 |
| Tooth brushing frequency | | | | | | | | |
| BF1 | 16 | 8 | 6 | 42.8 | 2 | 0 | 0 | 37.5 |
| BF2 | 51 | 19 | 19 | 50 | 10 | 3 | 23.1 | 43.1 |
| BF3 | 116 | 52 | 27 | 34.2 | 28 | 9 | 24.3 | 31 |
| BF4 | 22 | 11 | 5 | 31.2 | 4 | 2 | 33.3 | 31.9 |
| Brushing technique | | | | | | | | |
| BTe1 | 48 | 22 | 18 | 45 | 7 | 1 | 12.5 | 39.6 |
| Bte2 | 102 | 52 | 24 | 31.6 | 21 | 5 | 19.2 | 28.4 |
| Bte3 | 55 | 16 | 15 | 48.4 | 16 | 8 | 33.3 | 41.9 |
| Brushing duration | | | | | | | | |
| BD1 | 33 | 15 | 10 | 40 | 6 | 2 | 25 | 36.4 |
| BD2 | 86 | 41 | 18 | 30.5 | 23 | 4 | 14.8 | 25.6 |
| BD3 | 86 | 34 | 29 | 46 | 15 | 8 | 34.8 | 43 |
| Bristle type | | | | | | | | |
| BT1 | 36 | 13 | 10 | 43.5 | 9 | 4 | 30.8 | 38.9 |
| BT2 | 126 | 58 | 30 | 34.1 | 31 | 7 | 18.4 | 29.4 |
| BT3 | 14 | 5 | 5 | 50 | 2 | 2 | 50 | 50 |
| BT4 | 29 | 14 | 12 | 46.1 | 2 | 1 | 33.3 | 44.8 |
| Interproximal cleaning | | | | | | | | |
| Regularly | 73 | 35 | 20 | 36.4 | 11 | 7 | 38.9 | 36.9 |
| None | 132 | 55 | 37 | 40.2 | 33 | 7 | 17.5 | 33.3 |
| TOTAL | | | | 38.8 | | | 24.1 | 34.6 |

[a]Gingival recession is clinically present and the patient is aware.
[b]Gingival recession is clinically present but the patient is unaware.
[c]There is no gingival recession and the patient is aware.
[d]There is no gingival recession but the patient thinks he/she has.
A1: age (18–40); A2: age (41–60); A3: age (61–75); E1: elementary; E2:secondary; E3: high-school; E4: university; Dental Visit Frequency DVF1: every 6 months; DVF2: annually; DVF3: when have complaint; Tooth Brushing Frequency: BF1: not regularly; BF2: 1/day; BF3: 2/day; BF4: at least 3/day; Brushing Technique: BTe1: horizontal; BTe2: vertical; BTe3: Rolling; Brushing Duration: BD1: less than a minute; BD2: between 1 to 2 min; BD3: more than 2 min; Bristle Type: BT1: soft; BT2: medium; BT3: hard; BT4: no preference.

**Table 2.** Clinical periodontal parameters with respect to patients' perception of gingival recession (mean ± SD).

| | Gingival recession present ($n = 147$) | | No gingival recession ($n = 58$) | |
|---|---|---|---|---|
| | Perceived[a] ($n = 90$) | Unperceived[b] ($n = 57$) | Perceived[c] ($n = 44$) | Unperceived[d] ($n = 14$) |
| PPD | 2.32 ± 0.64 | 2.29 ± 0.61 | 2.06 ± 0.30 | 2.09 ± 0.39 |
| FMBS (%) | 48 ± 21 | 49 ± 23 | 48 ± 22 | 44 ± 21 |
| FMPS (%) | 52 ± 22 | 51 ± 24 | 50 ± 21 | 50 ± 21 |
| GRD | 1.07 ± 0.65* | 0.81 ± 0.70* | 0 | 0 |
| GRW | 3.23 ± 0.92 | 3.21 ± 1.12 | 0 | 0 |
| WKG | 3.33 ± 1.29 | 3.72 ± 1.39 | NA | NA |

*$p < .05$ ($p = .023$).
[a]Gingival recession is clinically present and the patient is aware.
[b]Gingival recession is clinically present but the patient is unaware.
[c]There is no gingival recession and the patient is aware.
[d]There is no gingival recession but the patient thinks he/she has.
PPD: Probing pocket depth; FMBS: Full mouth bleeding score; FMPS: Full mouth plaque score; GRD: Gingival recession depth; GRW: Gingival recession width; WKG: Width of keratinized gingiva; NA: not available.

**Table 3.** The subjects' opinion about the presence of cervical lesion, the probability of the progression of the gingival recessions and impact of gingival recessions on their oral health.

| | Gingival recession present ($n = 147$) | | No gingival recession ($n = 58$) | |
|---|---|---|---|---|
| | Perceived[a] ($n = 90$) | Unperceived[b] ($n = 57$) | Perceived[c] ($n = 44$) | Unperceived[d] ($n = 14$) |
| Presence of lesion | | | | |
| Present (n = 68; 33.7%) | n = 40 125 lesion | n = 28 63 lesion | NA | NA |
| Absent (n = 137; 66.83%) | n = 50 | n = 29 | n = 44 | n = 14 |
| Recession would get worse | | | | |
| Yes (n = 177; 86.34%) | n = 85 | n = 48 | n = 33 | n = 11 |
| No (n = 28; 13.66%) | n = 5 | n = 9 | n = 11 | n = 3 |
| Impact on oral health | | | | |
| Yes (n = 182; 88.78%) | n = 87 | n = 47 | n = 35 | n = 13 |
| No (n = 23; 11.22%) | n = 3 | n = 10 | n = 9 | n = 1 |

[a]Gingival recession is clinically present and the patient is aware.
[b]Gingival recession is clinically present but the patient is unaware.
[c]There is no gingival recession and the patient is aware.
[d]There is no gingival recession but the patient thinks he/she has.

**Table 4.** OHRQoL-UK scores of the patients according to perception of gingival recession, and the OHRQoL-UK total scores related to the responses of gingival recessions' progression and the impact on oral health (mean ± SD).

| | Gingival recession present ($n = 147$) | | No gingival recession ($n = 58$) | |
|---|---|---|---|---|
| | Perceived[a] ($n = 90$) | Unperceived[b] ($n = 57$ ) | Perceived[c] ($n = 44$) | Unperceived[d] ($n = 14$) |
| OHRQoL-UK symptom | 4.74 ± 1.41 | 4.87 ± 1.70* | 5.79 ± 2.08* | 4.57 ± 1.60 |
| OHRQoL-UK physical | 12.94 ± 3.13 | 13.19 ± 3.71† | 16.02 ± 5.16† | 13.21 ± 4.52 |
| OHRQoL psychological | 13.68 ± 2.64 | 13.50 ± 4.04‡ | 16.31 ± 4.54‡ | 14.35 ± 4.14 |
| OHRQoL-UK social | 11.17 ± 2.06 | 11.08 ± 2.80§ | 13.43 ± 3.41§ | 11.57 ± 3.22 |
| OHRQoL-UK total | 42.51 ± 8.06 | 42.66 ± 11.01‖ | 51.56 ± 14.38‖ | 43.71 ± 12.83 |
| OHRQoL-UK total | | | | |
| GR will progress (n = 177) | (n = 85) 42.09 ± 7.68 | (n = 48) 43.66 ± 10.77 | (n = 33) 51.78 ± 14.56 | (n = 11 ) 44.54 ± 14.16 |
| GR will not progress (n = 28) | (n = 5) 49.60 ± 11.88 | (n = 9) 37.33 ± 11.32 | (n = 11) 50.90 ± 14.48 | (n = 3) 40.66 ± 7.02 |
| OHRQoL-UK total | | | | |
| GR impacts oral health (n = 182) | (n = 87) 41.85 ± 7.34¶ | (n = 47) 43.76 ± 10.89 | (n = 35) 52.14 ± 15.17 | (n = 13) 43.38 ± 13.29 |
| GR not impact oral health (n = 23) | (n = 3) 61.66 ± 2.08¶ | (n = 10) 37.50 ± 10.59 | (n = 9) 49.33 ± 11.21 | (n = 1) 48.00 ± 0.00 |

*,†,‡,§,‖$p<.05$; significant difference between the values that marked with same signs on the same row.
¶$p<.05$; significant difference between the values that marked with same signs on the same column.
[a]Gingival recession is clinically present and the patient is aware.
[b]Gingival recession is clinically present but the patient is unaware.
[c]There is no gingival recession and the patient is aware.
[d]There is no gingival recession but the patient thinks he/she has.
OHRQoL-UK: oral health-related quality of life-United Kingdom; GR: gingival recession.

observed ($p<.05$). The participants who responded that gingival recessions had no impact on their oral health had better OHRQoL-UK scores.

Table 5 presents the OHRQoL-UK scores of the participants with respect to their gingival recession-related complaints. The results revealed that hypersensitivity tended to lower the OHRQoL-UK symptom, physical, psychological, social, and total scores significantly ($p < .05$). Aesthetic concerns and hypersensitivity also lowered OHRQoL-UK physical scores ($p < .05$).

Table 6 shows the acceptance status of the suggested treatment plans by the participants. Acceptance significantly increased with respect to having complaints. Hypersensitivity and aesthetics-related complaints seemed to stimulate acceptance. Further, the participants were more inclined to accept minimally invasive treatments compared with surgical treatments.

The correlation between the quality of life scores, responses of gingival recessions' progression, and the impact on oral health with respect to the participants' perception ($n = 90$) was also evaluated. A positive correlation was observed between perception of recession progressing and belief that the recessions have an impact on oral health ($r = 0.225$; $p < .05$). There were positive correlations between perception of recession progressing and OHRQoL-UK ($r = 0.214$, $p < .05$), and between belief of impact on oral health and OHRQoL-UK ($r = 0.444$; $p < .01$). The results revealed a negative correlation between the presence of any complaint and OHRQoL-UK ($r = -0.243$; $p < .05$).

In the group of 57 participants who had the misperception of having no gingival recession, a negative correlation was seen between the presence of any complaint and OHRQoL-UK ($r = -0.314$; $p < .05$). In 44 participants who had the perception of having no gingival recession, no correlations were observed with respect to OHRQoL-UK scores. In the 14 participants who had the misperception of having gingival recessions, a negative correlation between the presence of any complaint and OHRQoL-UK ($r = -0.565$; $p < .05$)

**Table 5.** OHRQoL-UK scores of the patients according to gingival recession related complaints (mean ± SD).

| | No complaint ($n = 133$) | Hypersensitivity ($n = 52$) | Aesthetic ($n = 8$) | Aesthetic and hypersensitivity ($n = 9$) | Other ($n = 3$) |
|---|---|---|---|---|---|
| OHRQoL-UK symptom | $5.22 \pm 1.79^{*}$ | $4.56 \pm 1.34^{*}$ | $4.62 \pm 2.06$ | $4.11 \pm 1.26$ | $4.66 \pm 1.15$ |
| OHRQoL-UK physical | $14.34 \pm 4.30^{\dagger,\ddagger}$ | $12.60 \pm 2.98^{\dagger}$ | $12.00 \pm 4.40$ | $11.00 \pm 2.64^{\ddagger}$ | $12.66 \pm 2.30$ |
| OHRQoL psychological | $14.73 \pm 4.03^{\S}$ | $13.21 \pm 2.93^{\S}$ | $14.12 \pm 2.47$ | $13.00 \pm 3.20$ | $11.66 \pm 2.88$ |
| OHRQoL-UK social | $12.07 \pm 3.02^{\|}$ | $10.84 \pm 2.11^{\|}$ | $11.50 \pm 2.72$ | $10.33 \pm 1.93$ | $9.66 \pm 2.08$ |
| OHRQoL-UK total | $46.34 \pm 12.17^{\P}$ | $41.23 \pm 8.31^{\P}$ | $42.25 \pm 10.74$ | $38.44 \pm 7.35$ | $38.66 \pm 7.63$ |

$^{*,\dagger,\ddagger,\S,\|,\P}p < .05$; presents statistical significance on the same row.
OHRQoL-UK: oral health-related quality of life-United Kingdom.

**Table 6.** The patients' acceptance of the suggested treatment plans with respect to gingival recession related conditions, symptoms and complaints.

| | No complaint ($n = 133$ patient/ 256 teeth) | Hypersensitivity ($n = 52$ patient/ 345 teeth) | Aesthetic ($n = 8$ patient/ 48 teeth) | Aesthetic and hypersensitivity ($n = 9$ patient/ 71 teeth) | Other ($n = 3$ patient/ 13 teeth) |
|---|---|---|---|---|---|
| Treatment recommended | 61 patient | 52 patient | 6 patient | 9 patient | 0 patient |
| Surgical treatment | | | | | |
| Recommended | 61 patient/239 teeth | 29 patient/184 teeth | 5 patient/20 teeth | 6 patient/37 teeth | NR |
| Accepted | 6 patient/50 teeth (9.81%) | 15 patient/111 teeth (51.72%) | 3 patient/13 teeth (60%) | 5 patient/36 teeth (83.33%) | |
| Hypersensitivity treatment | | | | | |
| Recommended | NR | 52 patient/345 teeth | NR | 8 patient/63teeth | NR |
| Accepted | | 50 patient/337 teeth (96.15%) | | 3 patient/35 teeth (37.5%) | |
| Restorative treatment | | | | | |
| Recommended | 3 patient/17 teeth | 23 patient/161 teeth | 4 patient/39 teeth | 8 patient/63 teeth | NR |
| Accepted | 1 patient/4 teeth (33.33%) | 20 patient/129 teeth (86.96%) | 0 patient (0%) | 4 patient/36 teeth (50%) | |

NR: not recommended.

was observed. However, this negative correlation was mostly the result of OHRQoL psychological ($r = -0.570$; $p < .05$) and social ($r = -0.600$; $p < .05$) scores.

The OHRQoL-UK scores of the participants with misperception of having gingival recession ($n = 14$), were negatively affected by gingival bleeding ($r = -0.792$; $p < .01$) and the presence of dental plaque ($r = -0.789$; $p < .01$). For the two groups of participants who were aware of their own gingival status ($n = 44$ and $n = 90$, respectively), the probing depth ($r = -0.321$; $p < .05$ and $r = -0.251$; $p < .05$, respectively), gingival bleeding ($r = -0.426$; $p < .01$ and $r = -0.301$; $p < .01$, respectively), and presence of plaque ($r = -0.492$; $p < .01$ and $r = -0.254$; $p < .05$, respectively) negatively affected OHRQoL-UK scores. The probing depth ($r = -0.404$; $p < .01$), presence of dental plaque ($r = -0.362$; $p < .01$), and gingival bleeding ($r = -0.421$; $p < .01$) of the participants with misperception of having no gingival recession ($n = 57$) negatively impacted their OHRQoL-UK scores.

## Discussion

This cross-sectional study evaluated participants' perceptions on gingival recessions, its impact on OHRQoL, and their acceptance of the suggested treatment plan. The tested null hypotheses were rejected. The results showed that participants had misperceptions on the presence of gingival recessions, and if there was any gingival recession, the participants thought that it had an impact on their oral health and that the recessions would progress in time. The OHRQoL-UK scores also indicated that gingival recession related symptoms and complaints led to poorer quality of life.

In the past, oral health was defined as the absence of chronic oro-facial pain, oral and pharyngeal cancer, oral and dental tissue lesions, and other diseases that affect the craniofacial complex [24]. More recently, the definition of oral health has broader circumstances with respect to individuals' subjective experiences on their health, along with clinical measures [25].

Periodontists decide on the possible treatment plans of any existing gingival recession depending on their knowledge and clinical experience [13]. In periodontal literature, numerous clinical studies have reported on the dental aspects of clinical situations underestimating patient perceptions and spontaneous patient requests for surgical or non-surgical treatment of gingival recessions [13]. However, information on patient perception and willingness to accept the proposed surgical/non-surgical treatment modalities remain scarce. In this context, OHRQoL has been a vital piece of oral health development research in the last decade by taking patients' subjective perceptions, expectations, and opinions into consideration [24].

Shetty et al. [14] investigated the awareness of gingival recession and its association to risk factors in 150 patients. Their results revealed that a majority of the patients (83.3%) were unaware of gingival recession and only 9.4% were aware of gingival recession for various causes. However, the research did not examine complaints/symptoms nor treatment modalities. In the current research, the outcome, rather than the causes, of gingival recession was evaluated.

Zaher et al. [26] reached out to dentists in Switzerland by post and evaluated the indications for the treatment of gingival recessions. Their results showed that aesthetics is the main indication for surgical treatments [26]. However, they

only evaluated dentists' opinion; patients' subjective evaluations of the need for treatment were not considered.

Nieri et al. [13] reported that the perception of buccal recessions by patients and personal spontaneous request of treatment are both critical issues. This is the first study that considered the perception of patients regarding the presence of gingival recessions. They shared information on patients' personal and spontaneous requests for surgical and non-surgical treatment. Although the number of observed recessions by clinicians was large, patients perceived only a few of them, which were mostly asymptomatic without aesthetic and functional impairment.

Unlike the current research, Nieri et al. [13] evaluated only existing gingival recessions. The present work enrolled participants who did not have gingival recessions. Participants' misperception of the presence of gingival recession may have affected the outcome regarding complaints and OHRQoL. Indeed, 14 participants had no gingival recessions; however, they thought they had gingival recessions. The results revealed that despite the absence of symptoms, a negative correlation was found between the presence of complaints and OHRQoL-UK. This negative correlation was mostly in the OHRQoL psychological and social domains.

Inflammation and destruction of the periodontium produces a wide range of clinical signs and symptoms, some of which may have a considerable impact on life quality [27]. Needleman et al. [28] reported that an increase in the number of deep periodontal pockets leads to poorer OHRQoL. In a later study, Ng et al. [29] criticized Needleman's sample group, which consisted of participants who were already seeking periodontal therapy. Accordingly, Needleman's research resulted in an elevated impact on quality of life scores with respect to periodontal status. In the present study, the gingival recession width, recession depth, and width of the keratinized gingiva did not affect gingival recession-dependent quality of life scores, regardless of the participants' awareness of their own gingival recessions.

Bekes and Hirsh [15] evaluated the influence of dentine hypersensitivity on OHRQoL. They concluded that patients with sensitive teeth have significant OHRQoL impairment. This finding relates to the proposed treatment modalities [15]. Likewise, in the present work, hypersensitivity and aesthetics played a major role in the acceptance of the treatment plan. The present results also revealed that patients tend to refuse surgical treatment unless they are symptomatic, with most patients tending to prefer non-invasive treatment modalities.

Dentine exposure by gingival recession and/or loss of enamel is generally accepted as a predisposing factor for dentine hypersensitivity [30]. The answer of how could an appropriate stimulus applied to dentine surface evokes an instantaneous painful response has not been clearly stated [31]. In this study, the existence of hypersensitivity was evaluated by an air-blast test and recession sites were also examined with a dental explorer. Evaporative, thermal and tactile tests have been used clinically to replicate and confirm the patients' sensitivity pain in response to chemical, thermal, tactile or osmotic stimuli [32]. Selecting the appropriate stimulus which can evoke a response is another issue to concern. Of these pain provocation tests, generally air-blast and/or tactile tests are used [33], although studies of these tests revealed less effective results when compared to one to another [34,35]. Thus, application of at least two different stimuli is recommended [36]. On the other hand, it should be kept in mind that assessment of dentine hypersensitivity always has a subjective basis and depends on the patients' reaction to different stimuli which may be affected by patients' pain perception, psychological and emotional factors [37]. The air-blast test and examination of recession sites with an explorer seemed to be effective to provoke a stimulus in this study however; application of another and/or additional test(s) and requesting the responses on a standard scale would have revealed the dentine hypersensitivity more clearly and would have decreased the subjectivity of the results.

In statistics, 'significant' defines the likelihood of a result being due to chance, or the amount of acceptable uncertainty [38], on the other hand 'clinical significance' has to shown a meaningful change of a parameter used to evaluate periodontal status [39]. Depending on the cross-sectional design of the study, the data given by means of periodontal parameters reflect the current situation of the patients. The comparison of perceived and unperceived patients with gingival recessions revealed that except the gingival recession depth, the difference between the groups for all periodontal parameters were statistically insignificant. The replacement of gingival margin due to gingival recessions (increase in gingival recession depths) results with the increased crown lengths clinically which could affect the recession awareness of the patients. However, the difference between the mean GRD parameters was too small to make a significant difference clinically and should be interpreted carefully.

Participants recruited from the patients referred to periodontology clinic irrespective of the referral reasons. Thus, sub-grouping of patients with respect to gingival recession awareness and response to research questions had led to a non-homogenous distribution of patients in sub-groups. Although, statistical analysis of these sub-groups revealed significant results, interpreting these results should be done carefully as the number of patients in some groups were limited.

The selected population is another limitation of the current research. The participants were patients seeking periodontal therapy. Conducting similar studies in wider populations with different demographic distributions will provide more meaningful results.

## Conclusions

The cross-sectional design of the study and sub-grouping of the study population had led a decreased number of patients in some groups which might be considered as a limitation. The following conclusions could be derived in spite of the non-homogeneous sub-grouping of the participants.

The patients might be unaware of their gingival recession and the gingival recession related factors may lead to poorer oral health-related quality of life which is an important component of quality of life. Dental professionals should constitute a perspective for improving patients' gingival recession awareness as well as focussing on its treatment. Enhancing periodontal health by means of the therapies to eliminate gingival recession related complaints might have broader affects than expected.

## Notes

1. Hu-Friedy, Frankfurt, Germany.
2. SPSS Inc., Chicago, Illinois, USA.

## Ethical approval

This study was approved by Başkent University Institutional Review Board and Ethics Committee (Project No: D-KA15/15).

## Disclosure statement

The authors report no conflict of interest.

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