ORIGINAL ARTICLE

Oral health related quality of life is affected by disease activity in Behçet's disease

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OBJECTIVES: This study aimed to investigate oral and general health related quality of life (QoL) in patients with Behçet's Disease (BD) and to assess the performance of Turkish versions of oral health related quality questionnaires.

SUBJECTS AND METHODS: Ninety-four BD patients, 24 patients with recurrent aphthous stomatitis (RAS), 113 healthy controls (HC) and 44 dental patients were investigated. QoL was assessed by oral health impact profile-14 (OHIP-14), oral health related quality of life (OHQoL) and short form-36 (SF-36) questionnaires.

RESULTS: OHQoL, OHIP-14 and SF-36 subscale scores were significantly worse in patients with BD compared with those in HC (P < 0.05). Both OHIP-14 and OHQoL scores were significantly worse in active patients compared with inactives in BD and RAS (P < 0.05). Scores of SF-36 Role physical, Role emotional and Vitality were also lower in active patients than in inactives in BD (P < 0.05). Scores of OHIP-14 and OHQoL were significantly worse in patients treated with colchicine compared with those treated with immunosuppressives (P < 0.05).

CONCLUSIONS: Both oral and general QoL was impaired in BD and associated with disease activity and treatment modalities. Translated Turkish versions of OHIP-14 and OHQoL were also observed to be valid and reliable questionnaires for further studies.

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Keywords: quality of life; disease activity; treatment modalities; Behçet's disease

Introduction

The impact of health on the quality of life (QoL) has received increased attention recently in both medicine and dentistry (Kressin *et al*, 2002; McGrath and Bedi,

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2002). Oral health can be conceptualized as a conditionspecific component of health status and health-related QoL (Chavers *et al*, 2002). Multidimensional assessments of oral functioning and well-being, labelled as 'oral quality of life', are increasingly used to provide assessments of health, health care needs and outcomes of care (Kressin *et al*, 2001).

Oral health-related quality of life (OHQoL) assessments are used in oral health surveys, clinical trials and studies evaluating the outcomes of dental care. Therefore, they may also play an important role in clinical practice in terms of identifying needs, selecting therapies and monitoring patient progress (Vissink *et al*, 2003a,b; Locker *et al*, 2004; McMillan *et al*, 2004).

The Oral Health Impact Profile (OHIP) and the OHQoL are amongst the most widely used instruments in studies evaluating oral health and QoL. These measures are based on two conceptually distinct models of oral health (Hegarty *et al*, 2002). The OHIP, originally developed in Australia, is based on a conceptual model of oral health that uses the World Health Organization (WHO) International Classification of Impairments, Disabilities and Handicaps framework (Slade, 1997; Hegarty *et al*, 2002). OHQoL has recently been developed in United Kingdom and is based on the WHO model of 'structure-function-ability-participation', which incorporates both negative and positive influences on health (Hegarty *et al*, 2002; McGrath and Bedi, 2003).

Determining QoL in terms of health care is an important outcome in chronic diseases such as Behcet's disease (BD) (Tanrıverdi et al, 2003), which is characterized by oro-genital ulcers and cutaneous, ocular, arthritic, vascular, central nervous system and gastrointestinal involvements (Tanriverdi et al, 2003;Al-Otaibi et al, 2005). In our recent study, active oral ulcers, the most common clinical finding in BD, was observed to be a significant factor for poor oral health (Mumcu et al, 2004). Yet, the effect of oral ulcers and oral health on oral QoL has not been investigated previously. Validated, standardized instruments were also not available to evaluate OHQoL in Turkish literature.

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Therefore, the aims of this study was to investigate oral and general health related QoL in patients with BD compared with controls and to assess the performance of Turkish versions of OHQoL questionnaires.

Materials and methods

In this cross-sectional study, 94 BD patients (F/M: 46/ 48, mean age: 33.6 ± 8.7 years) classified according to the International Study Group (ISG) criteria (International Study Group for Behçet's disease, 1990), 24 patients with recurrent aphthous stomatitis (RAS, F/M: 11/13, 34.1 ± 11.7 years) diagnosed according to the history of complaints and clinical findings (Porter *et al*, 1998), 113 healthy controls (HC, F/M: 56/57, 34.1 ± 11.9 years) and 44 dental patients (F/M: 22/22 35.6 ± 13.3 years) were investigated. Data were collected by clinical examinations and questionnaires regarding QoL. Both HC and healthy dental patients were included to evaluate the performance of oral health related quality questionnaires.

Behçet's disease and RAS patients with active clinical symptoms in the previous 3 months were categorized as the active group (n = 41, 44%) in BD and n = 9, 38% in RAS) in the clinical examination. Positive pathergy reaction was observed in 69% (n = 65). The distributions of clinical manifestations in the active group were as follows: oral ulcers (100%), uveitis (73%), genital ulcers (46%) and cutaneous (56%), arthritic (51%), vascular (34%), neurologic (12%) and gastrointestinal involvements (12%) in BD. Fifty-one patients, mainly with active mucocutaneous involvement, were treated by colchicine $(1-2 \text{ mg day}^{-1})$ whereas 36 patients used immunosuppressive agents (cyclosporin-A, azathioprine and corticosteroids). Seven patients were not under any treatment modality regularly due to lack of compliance. Topical steroids and antimicrobial agents were chosen for oral ulcers in patients with RAS. Total clinical severity scores were determined as previously described (Krause et al, 2001). The frequency and healing time of oral ulcers recorded follow chart per month between 3-monthly clinical examinations in active patients, the number of natural teeth, missing teeth, carious teeth and fillings were also noted.

Three patient-centred outcome measures – two specific questionnaires for oral health, the 14-item OHIP-14 and the 16-item OHQoL measure (OHQoL-UK), and the SF-36, the short-form general measure of health status – were used in the study. Following initial instructions, the patients and controls completed these questionnaires. Trained interviewers (n = 3) who were not involved in any dental assessment or treatment helped to individuals with visual impairment or illiterates in filling the questionnaires.

The SF-36 questionnaire was translated and validated into Turkish by Koçyiğit *et al.* (1999). High scores indicated a better health-related QoL (Koçyiğit *et al*, 1999; Tanrıverdi *et al*, 2003). The OHIP questionnaire consists of 49 items. A short version of the instrument (OHIP-14) that was developed and validated by Slade

(1997) and used previously with good reliability and validity (Slade, 1997; Llewellyn and Warnakulasuriya, 2003; Kushner et al, 2004) was chosen for the study. Better OHQoL was indicated with lower scores in OHIP-14, and higher scores in OHOoL questionnaires (Hegarty et al, 2002; McGrath and Bedi, 2003; McGrath et al, 2003a). The questionnaires were translated into Turkish in accordance with cross-cultural adaptation guidelines to produce Turkish versions of the OHIP-14 and OHQoL (Beaton et al, 2000). Forward and backwards translations of the measures were performed by a small group of bilingual (English and Turkish) translators, including two professional translators (one of them was a native speaker of English), dentists and medical doctors. In order to test construct validity, the associations between OHIP-14 and OHQoL scores and the number of teeth, toothache experienced in the last year, and self report dental attendance pattern (reasons for the last dental visit) were examined (Dini et al, 2003).

Criterion validity was evaluated by self reported oral health status (excellent/very good, good, fair/poor) and self reported dental treatment need. Reliability was evaluated in two ways: internal reliability (Cronbach's alpha) and external reliability; external reliability was assessed by test–retest. The first 10% of the HC were contacted again after a period of 1 week to complete the questionnaires (Dini *et al*, 2003).

The criteria for exclusion from the study were pregnancy, chronic diseases, psychiatric disorders, cancer and other oral mucosal disorders. The study was approved by the Local Ethics Committee and informed consent was taken.

Statistical analysis

Data were analysed by using SPSS 11.0 statistics programme (SPSS Inc, Chicago, IL, USA). Analysis of variance (ANOVA), *post hoc* Tukey, and independent *t*-test were used in comparisons of groups. Nonparametric tests such as Kruskall–Wallis, Mann– Whitney *U*-tests were used when the distributions of data were non-normal and few subjects were included in the analyses. The relationship between clinical variables and scores of questionnaires were evaluated by Pearson correlation test. *P*-value ≤ 0.05 was accepted as significant.

Results

Oral and general health related quality of life

The mean scores of the OHQoL were significantly worse in patients with BD (42.02 ± 11.4) compared with those in RAS patients (50.1 ± 15.7) and HC (48.7 ± 13.6) (P = 0.040 and P = 0.002, respectively). The mean score of the OHIP-14 was also significantly worse in patients with BD (20.5 ± 14.0) than HC (12.3 ± 15.5) and dental patients (15.1 ± 14.5) (P = 0.000 and P = 0.032, respectively). Yet, no significant difference was observed between patients with BD and RAS (15.3 ± 15.3) in OHIP-14 scores (P = 0.06). No significant difference was observed in scores of OHIP-14 and OHQoL between RAS and HC (P < 0.05). In addition,

	Behçet's disease $(n = 94)$	Recurrent aphthous stomatitis $(n = 24)$	Healthy control $(n = 113)$	Dental patients $(n = 44)$	<i>P</i> -value
OHIP	20.5 ± 14.0	15.3 ± 15.3	12.3 ± 15.5	15.1 ± 14.5	0.000 ^b
OHRQoL	42.02 ± 11.4	50.1 ± 15.7	48.7 ± 13.6	43.6 ± 13.9	0.001^{a}
SF 36-Physical Functioning	64.5 ± 31.7	87.6 ± 23.4	87.7 ± 21.7	87.5 ± 27.4	$0.000^{\rm a}$
SF 36-Role-Physical	57.6 ± 46.4	80.2 ± 36.1	79.7 ± 34.6	79.1 ± 38.5	$0.000^{\rm a}$
SF 36-Bodily Pain	57.01 ± 26.8	69.5 ± 21.8	73.8 ± 21.7	78.2 ± 21.3	$0.000^{\rm a}$
SF 36-General Health	42.5 ± 19.1	56.0 ± 22.4	67.6 ± 19.1	67.3 ± 9.8	$0.000^{\rm a}$
SF 36-Vitality	45.5 ± 21.6	$54.5~\pm~22.5$	55.1 ± 18.6	44.1 ± 8.9	$0.004^{\rm a}$
SF 36-Social Functioning	65.8 ± 26.2	$80.7~\pm~20.8$	80.6 ± 20.5	66.7 ± 13.8	0.000^{a}
SF 36-Role Emotional	62.2 ± 45.8	84.1 ± 36.1	$79.2~\pm~36.5$	56.1 ± 13.2	$0.000^{\rm a}$
SF 36-Mental Health	39.4 ± 16.9	44.0 ± 15.8	$45.8~\pm~12.4$	$39.4~\pm~7.1$	0.024 ^a

Table 1 Quality of life scores in patients with Behçet's disease and recurrent aphthous stomatitis and healthy controls

Values are given as mean \pm s.d.

OHIP, oral health impact profile; OHRQoL, oral health related quality of life. ^aANOVA and ^bKruskal–Wallis test was used in the analysis.

OHQoL scores in dental patients were significantly worse than those in HC (P = 0.038) (Table 1).

The SF-36 subscale scores were lower in patients with BD than HC (P < 0.05). SF-36 subscale scores, except in Vitality and Mental health, were significantly better in patients with RAS compared with those with BD (P < 0.05) (Table 1). Subscale scores of SF-36, except General health (P = 0.010) had shown no significant difference between RAS patients and HC (P > 0.05). Scores of SF-36-Physical functioning, -Role physical, -Bodily pain, -General health was significantly lower in BD compared with dental patients (P = 0.000, P = 0.006, P = 0.000 and P = 0.000, respectively) (Table 1).

Oral health, oral ulcers and oral health related quality of life

The healing time of oral ulcers was higher in patients with BD (8.1 ± 2.3 days) compared with those with RAS (6.1 ± 1.6 days) (P = 0,003). Yet, the frequency of oral ulcers was higher in RAS than BD (3.9 ± 3.6 vs 3.2 ± 8.8) (P = 0.046). No significant difference was observed in the mean number of natural teeth and filled teeth in patients with BD compared with those with RAS, HC and dental patients (P > 0.05). The number of extracted teeth was significantly higher in BD than HC and dental patients (P = 0.000 and P = 0.001, respectively) (Table 2). The OHIP-14 and OHQoL scores correlated with the number of natural teeth in BD (r = -0.2 P = 0.041 and r = 0.2 P = 0.017, respectively). In HC, OHIP-14 and OHQoL scores correlated with the number of extracted teeth (r = 0.3 P = 0.001 and r = -0.4 P = 0.000, respectively). Significant correlations were found between OHQoL scores with the number of natural and the filled teeth in patients with RAS (r = 0.5 P = 0.005 and r = 0.5 P = 0.009, respectively). OHQoL scores correlated with the number of natural and the filled teeth in patients (r = 0.3 P = 0.027 and r = -0.4 P = 0.001, respectively).

Disease activity and quality of life

Both OHIP-14 and OHQoL scores were significantly worse in active patients compared with inactive ones in BD and RAS (P = 0.000, P = 0.010 in BD vs P = 0.035and P = 0.005 in RAS, respectively). Scores of SF-36 Role physical, Role emotional and Vitality were lower in active patients than in inactive ones (P = 0.032, P = 0.031 and P = 0.050, respectively), although subscale scores were worse in active BD patients. In patients with RAS, no significant difference was observed in SF-36 subscale scores (Table 3) (P > 0.05).

Treatment modalities and quality of life

Immunosuppressive treatment significantly decreased the frequency of oral ulcers (1.1 ± 1.2) compared with

	Behçet's disease (n = 94)	Recurrent aphthous stomatitis $(n = 24)$	Healthy control $(n = 113)$	Dental patients $(n = 44)$	<i>P</i> -value
The number of natural teeth	236 ± 48	23.1 ± 7.01	249 + 62	258 + 33	0.07^{a}
The number of carious teeth	1.8 ± 3.8	1.9 ± 2.4	1.6 ± 2.7	3.2 ± 3.1	$0.000^{\rm b}$
The number of extracted teeth	4.1 ± 4.8	4.8 ± 7.1	2.9 ± 6.2	2.2 ± 3.4	0.000^{b}
The number of filled teeth	1.1 ± 1.7	1.5 ± 2.6	1.2 ± 1.7	1.4 ± 1.4	0.10^{b}
The number of oral ulcers/month	3.2 ± 8.8	3.9 ± 3.6	-	-	0.046 ^c
Healing time of oral ulcers (day)	$8.1~\pm~2.3$	6.1 ± 1.6	-	-	0.003 ^d

Values are given as mean \pm s.d.

^aANOVA, ^bKruskal–Wallis, ^cMann–Whitney U and ^dindependent *t*-tests were used in the analysis.

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	Behçet's disease $(n = 94)$			Recurrent aphthous stomatitis $(n = 24)$			
	Active $(n = 41)$	Inactive $(n = 53)$	P-value	Active $(n = 9)$	Inactive $(n = 15)$	P-value	
OHIP-14	26.9 ± 12.8	15.5 ± 12.8	0.000^{b}	23.4 ± 16.03	10.4 ± 13.1	0.035 ^a	
OHRQoL	36.3 ± 9.1	46.3 ± 11.1	0.010^{b}	41.1 ± 8.6	55.4 ± 16.8	0.005^{a}	
Sf36-Physical Functioning	63.3 ± 33.6	67.1 ± 30.5	0.57 ^b	75.0 ± 36.2	94.3 ± 8.2	0.39^{a}	
Sf36-Role-Physical	45.6 ± 46.6	66.8 ± 44.4	0.032 ^a	77.7 ± 44.1	81.6 ± 31.9	0.95 ^a	
Sf36-Bodily Pain	54.1 ± 25.9	59.3 ± 27.5	0.35 ^b	67.2 ± 22.7	70.8 ± 22.0	0.68^{a}	
Sf36-General Health	38.9 ± 18.2	45.3 ± 19.6	0.11 ^b	55.5 ± 22.9	56.2 ± 22.9	$0.95^{\rm a}$	
Sf36-Vitality	40.5 ± 18.2	49.3 ± 23.2	0.050^{b}	56.6 ± 23.1	53.3 ± 22.9	0.72^{a}	
Sf36-Social Functioning	63.5 ± 23.02	67.6 ± 28.5	0.48^{b}	77.7 ± 24.02	82.5 ± 19.3	0.77^{a}	
Sf36-Role Emotional	49.5 ± 47.5	71.7 ± 42.8	0.031 ^b	77.7 ± 44.1	88.1 ± 30.9	0.73^{a}	
Sf36-Mental Health	$35.9~\pm~16.9$	42.1 ± 16.6	0.007^{b}	$44.4~\pm~16.4$	43.7 ± 16.1	0.86^{a}	

Table 3 Quality of life scores in patients with Behçet's disease and recurrent aphthous stomatitis according to disease activity

Values are given as mean \pm s.d.

OHIP, oral health impact profile; OHRQoL, oral health related quality of life. ^aMann–Whitney U and ^bindependent *t*-tests were used in the analysis.

colchicine usage (1.8 ± 1.2) (P = 0.033). No significant difference was observed in dental indices (P > 0.05). Both OHIP and OHQoL scores were significantly worse in patients treated with colchicine (23.2 ± 15.1 and 40.04 ± 11.6 , respectively) compared with those treated with immunosuppressives (16.9 ± 12.3 and 46.2 ± 10.2 , respectively) (P = 0.037 vs P = 0.013, respectively) (Table 4).

In BD, clinical severity score was significantly higher in patients treated with immunosuppressives (8.08 ± 2.04) than those using colchicine (6.05 ± 2.7) (P = 0.000). Scores of SF-36 – Bodily pain, General health and Vitality were significantly higher in patients using immunosuppressives $(66.0 \pm 24.9, 48.03 \pm 20.02)$ and 50.2 ± 20.5 , respectively) compared with colchicine group $(50.7 \pm 26.2, 38.4 \pm 17.2)$ and 40.3 ± 21.1 , respectively) (P = 0.008, P = 0.021) and P = 0.032, respectively) (Table 4). A weak negative correlation was observed between clinical severity score and SF-36 Role physical and Mental health scores (r = -0.2)P = 0.036).

 Table 4 Quality of life scores in patients with Behçet's disease according to treatment modalities

	Colchicine $(n = 51)$	Immunosupressive $(n = 36)$	<i>P</i> -value
OHIP	23.2 ± 15.1	16.9 ± 12.3	0.037 ^a
OHRQoL	40.04 ± 11.6	46.2 ± 10.2	0.013 ^a
Sf36-Physical Functioning	$62.09~\pm~32.7$	$67.8~\pm~30.3$	0.48 ^a
Sf36-Role-Physical	60.0 ± 47.6	54.2 ± 45.5	0.58^{a}
Sf36-Bodily Pain	50.7 ± 26.2	66.0 ± 24.9	0.008^{a}
Sf36-General Health	38.4 ± 17.2	48.0 ± 20.02	0.021^{a}
Sf36-Vitality	40.3 ± 21.1	50.2 ± 20.5	0.032^{a}
Sf36-Social Functioning	64.1 ± 26.6	68.4 ± 26.3	0.47^{a}
Sf36-Role Emotional	65.9 ± 45.8	58.1 ± 46.6	0.44^{a}
Sf36-Mental Health	$37.7~\pm~15.4$	$40.6~\pm~18.9$	0.43 ^a

Values are given as mean \pm s.d.

OHIP, oral health impact profile; OHRQoL, oral health related quality of life.

^aIndependent *t*-test was used in the analysis.

Oral Diseases

Validity and reliability of OHIP-14 and OHQoL auestionnaires

Poor OHQoL scores were associated with having natural teeth < 20, toothache experience in the past year, emergency treatment needs in the last dental visit, poor self-reported oral health status and dental treatment need in HC and dental patients (Tables 5 and 6). The associations between OHIP and OHQoL scores and the number of natural teeth, toothache experienced, and reasons for last dental visit supported the construct validity of the indicators. These questionnaires were also associated with the self-reported oral health status and perceived treatment needs supporting the criterion validity of the indicator in these groups. Similar trends were observed in patients with BD and RAS (Tables 5 and 6).

Internal reliabilities (Cronbach's alpha) of OHIP-14 (0.94) and OHQoL (0.96) were found to be high. In OHIP-14, Cronbach's alpha coefficients were 0.92 in BD, 0.95 in RAS and 0.95 in HC and 0.98 in dental patients. These coefficients were 0.93 in BD, 0.97 in RAS, 0.97 in HC and 0.98 in dental patients for OHQoL, and 0.92 in BD, 0.92 in RAS, 0.93 in HC and 0.87 in dental patients for SF-36.

The correlation between each individual item and the total OHIP-14 score was between 0.21 and 0.75 in BD patients, 0.45–0.82 in RAS patients, 0.30–0.81 in HC and 0.53–0.85 in dental patients. The OHQoL correlations item-total score were between 0.26 and 0.72 in BD, 0.46–0.73 in RAS and 0.72–0.86 in HC and 0.61–0.87 in dental patients. No correlation was observed to be negative in these instruments.

The test-retest correlations, measured by Spearman's correlation coefficient for OHIP-14 and OHQoL, ranged between 0.64–0.79 and 0.67–0.99 only in the HC group (P < 0.05), as oral ulcer related factors and dental treatments could affect the results.

Discussion

Quality of life assessments have an important place in health care and became an accepted end-point in clinical

	Behçet's disease $(n = 94)$	Recurrent aphthous stomatitis $(n = 24)$	Healthy control $(n = 113)$	Dental patients $(n = 44)$
Number of natural teeth	L			
≥20	$20.02 \pm 14.1 \ (n = 75)$	$22.4 \pm 17.3 \ (n = 16)$	$10.8 \pm 11.5 \ (n = 97)$	$11.3 \pm 11.5 (n = 36)$
< 20	$22.4 \pm 13.8 (n = 19)$	$39.6 \pm 9.1 (n = 8)$	$21.6 \pm 14.6 (n = 25)$	$30.7 \pm 16.3 (n = 8)$
<i>P</i> -value	0.50 ^c	0.26 ^b	0.010 ^b	0.003 ^b
Toothache experience				
Yes	$25.7 \pm 12.3 \ (n = 69)$	$17.4 \pm 14.5 (n = 16)$	$17.6 \pm 12.2 \ (n = 69)$	$18.7 \pm 14.1 \ (n = 34)$
No	$6.1 \pm 5.6 (n = 25)$	$11.1 \pm 17.1 \ (n=8)$	$4.1 \pm 7.6 (n = 44)$	$1.7 \pm 4.4 \ (n = 10)$
<i>P</i> -value	0.000 ^c	0.17 ^b	0.000 ^b	0.000 ^b
Self reported oral health				
Excellent/very good	$6.0 \pm 7.1 \ (n = 7)$	$4.6 \pm 5.7 (n = 8)$	$6.9 \pm 8.5 (n = 30)$	$8.2 \pm 13.8 \ (n=9)$
Good	$12.03 \pm 9.7 (n = 31)$	$8.6 \pm 4.1 \ (n = 5)$	$8.3 \pm 9.0 \ (n = 51)$	$11.7 \pm 11.6 (n = 18)$
Fair/poor	$27.01 \pm 12.7 \ (n = 56)$	$26.1 \pm 16.3 (n = 11)$	$23.9 \pm 13.2 \ (n = 32)$	$22.1 \pm 15.4 \ (n = 17)$
<i>P</i> -value	0.000^{a}	0.003 ^a	0.000^{a}	0.032 ^a
Perceived treatment need	1			
Yes	$25.9 \pm 12.4 \ (n = 71)$	$28.0 \pm 15.7 \ (n = 10)$	$22.8 \pm 11.3 \ (n = 47)$	$25.3 \pm 12.5 (n = 23)$
No	$9.5 \pm 9.9 (n = 23)$	$6.2 \pm 5.7 (n = 14)$	$4.9 \pm 6.7 (n = 66)$	$3.5 \pm 4.1 (n = 21)$
<i>P</i> -value	0.000 ^b	0.000 ^b	0.000 ^b	0.000 ^c
Usual reason for dental	visit			
Control	$13.5 \pm 17.0 \ (n = 4)$	_	$7.1 \pm 9.1 \ (n = 27)$	$0.0 \pm 0.0 (n = 4)$
Emergency	$20.8 \pm 3.8 \ (n = 90)$	$15.3 \pm 15.3 \ (n = 24)$	$14.02 \pm 13.1 \ (n = 86)$	$16.7 \pm 14.3 (n = 40)$
<i>P</i> -value		_	0.005 ^b	

Table 5 Construct and criterion validity in oral health impact profile-14 scores in patients and controls

Values are given as mean \pm s.d.

^aKruskal–Wallis, ^bMann–Whitney U and ^cindependent *t*-tests were used in the analysis.

Table 6	Construct and	criterion valid	ity in ora	l health related	quality of	life scores in	patients and	controls
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	Behçet's disease $(n = 94)$	Recurrent aphthous stomatitis $(n = 24)$	Healthy control $(n = 113)$	Dental patients $(n = 44)$
Number of natural teeth				
≥ 20	$43.4 \pm 11.5 (n = 79)$	$57.8 \pm 16.1 \ (n = 16)$	$49.8 \pm 13.1 \ (n = 97)$	$46.6 \pm 11.9 \ (n = 36)$
< 20	$36.6 \pm 9.4 (n = 15)$	$39.6 \pm 9.1 (n = 8)$	$42.1 \pm 15.7 (n = 16)$	$30.0 \pm 14.6 (n = 8)$
<i>P</i> -value	0.020 ^d	0.053 ^b	0.038	0.003 ^b
Toothache Experience				
Yes	$38.6 \pm 9.2 \ (n = 25)$	$53.7 \pm 19.1 \ (n = 16)$	$55.4 \pm 9.8 \ (n = 44)$	$40.3 \pm 13.3 \ (n=9)$
No	51.1 ± 12.1 $(n = 69)$	$48.2 \pm 14.1 (n = 8)$	$44.5 \pm 14.1 (n = 69)$	$54.8 \pm 9.6 (n = 36)$
<i>P</i> -value	$0.000^{\rm d}$	0.23 ^c	$0.000^{\rm d}$	0.000 ^c
Self reported oral health				
Excellent/very good	$68.7 \pm 8.7 (n = 7)$	$64.1 \pm 10.7 \ (n=8)$	$64.4 \pm 6.9 \ (n = 30)$	$59.4 \pm 6.9 (n = 9)$
Good	$45.2 \pm 6.2 (n = 31)$	$48.2 \pm 6.2 (n = 5)$	$48.1 \pm 6.02 \ (n = 51)$	$46.6 \pm 8.1 \ (n = 18)$
Fair/poor	$36.8 \pm 8.1 \ (n = 56)$	$40.7 \pm 14.8 \ (n = 11)$	$34.9 \pm 11.6 (n = 32)$	$32.1 \pm 11.6 (n = 17)$
P-value	0.000 ^b	0.001 ^b	0.000 ^a	0.000 ^b
Perceived treatment need				
Yes	$39.2 \pm 9.4 \ (n = 63)$	$39.1 \pm 10.9 \ (n = 10)$	$42.5 \pm 14.1 \ (n = 47)$	$38.3 \pm 11.3 \ (n = 23)$
No	$47.6 \pm 13.1 (n = 31)$	$57.9 \pm 14.1 (n = 14)$	$53.1 \pm 11.4 (n = 66)$	$49.4 \pm 14.4 (n = 21)$
<i>P</i> -value	0.001 ^d	0.005 ^c	$0.000^{\rm d}$	0.000 ^d
Usual reason for dental v	visit			
Control	$44.5 \pm 12.8 \ (n = 4)$	_	$53.6 \pm 8.4 \ (n = 27)$	$59.7 \pm 13.02 \ (n = 4)$
Emergency	$41.9 \pm 11.4 (n = 90)$	$50.1 \pm 15.7 \ (n = 24)$	$47.1 \pm 14.6 (n = 86)$	$42.02 \pm 13.1 (n = 40)$
<i>P</i> -value	_	_	0.031 ^d	_

Values are given as mean \pm s.d. ^aANOVA, ^bKruskal–Wallis, ^c: Mann-Whitney U and ^dindependent *t*-tests were used in the analysis.

research trials in recent years (Sanders et al, 1998). The effects of illness on QoL can be related to the impairment, disability and handicap model of disease (Scott and Garrood, 2000). OHQoL focuses on those aspects of human life that are affected by oral health and dental care (Chavers et al, 2002). Oral health status is closely associated with QoL (Kushner et al, 2004) and impaired

OHQoL could originate from poor oral health status (Kressin et al, 2002). Oral complications that develop following high dose chemotherapy/radiotherapy and haematopoietic cell transplantation have previously been shown to have a negative impact on QoL (Epstein et al, 2002, 2004; McMillan et al, 2004; Vissink et al, 2003a,b).

Measurement of QoL may help to assess better chronic conditions such as Behçet's disease, characterized by multisystem involvement (Tanrıverdi *et al*, 2003). In addition, the evaluation of the effects of oral ulcers on OHQoL issues might be a part of clinical decision processes.

Poor OHQoL status and increase in tooth loss was observed in patients with BD compared with HC in our study. Significant correlations were observed between oral clinical variables and oral QoL status. Although a prolonged healing time of oral ulcers was seen in BD and increase in the frequency of oral ulcers in RAS, OHIP-14 scores were similar in BD and RAS patients. Yet, OHQoL scores were significantly worse in BD compared with RAS patients. These differences could be explained by different evaluation criteria of the two questionnaires. OHIP scores determine the impact of oral QoL whereas both positive (functioning) and negative (disabling) aspects of health status are evaluated by using the OHQoL questionnaire.

Active BD and RAS patients with oral ulcers reported poor OHQoL in our study, similar to the findings of Llewellyn and Warnakulasuriya (2003). Hegarty *et al* (2002) also observed that patients with oral ulcerations had a worse OHQoL compared with those with erosions of oral lichen planus (McGrath *et al*, 2003b). Although the majority of oral diseases are not fatal, they give rise to significant morbidity, resulting in physical, social and psychological consequences that affect QoL. The oral cavity contributes to QoL through enhancing selfesteem, self-expression, communication and increased facial aesthetic value (Kushnir *et al*, 2004).

In our study, health-related QoL determined by SF-36 was significantly worse in patients with BD than HC, without any association with specific organ involvements. SF-36 'Role-physical' and 'Role-emotional' and Vitality subscale scores were significantly lower in active BD patients. In a similar study, Tanriverdi *et al* (2003) observed that BD patients with only ocular involvement had a poorer health-related QoL compared with HC.

It is relatively common to measure QoL in studies designed to assess different treatment modalities as the goal of health care is to eliminate symptoms of disease and provide the highest QoL (Sanders *et al*, 1998).

As an interesting observation in our study, oral and general health-related QoL were enhanced in BD patients treated with immunosuppressive agents compared with those on colchicine. As immunosuppressive treatments eliminate oral ulcers efficiently and suppress other disease activity, they seem to provide a better QoL for BD patients. However, their long-term consequences should still preclude clinicians from using them indiscriminately for minor organ involvements of BD such as mucocutaneous problems.

In OHQoL, more impacts were detected in healthy people and dental patients having toothache experience in the last year, dental treatment needs, irregular dental attendance, whose natural teeth numbers were < 20 and self-report oral health statuses were poor. These results supported the criterion and construct validity and were accordance with the previous studies (Dini *et al*, 2003;

McGrath and Bedi, 2003; Kushnir *et al*, 2004). Similar findings were observed in patients with BD and RAS in the study.

Internal consistencies of translated Turkish versions of questionnaires as assessed by Cronbach's alpha values were similar to those reported in the original English versions (Slade, 1997; Hegarty *et al*, 2002; Llewellyn and Warnakulasuriya, 2003). Test–retest correlation coefficients for both questionnaires were high. With the above construct and content validity results, the Turkish versions of OHIP-14 and OHQoL questionnaires were found to be valid and reliable instruments.

In conclusion, both oral and general QoL was impaired in BD and associated with disease activity and treatment modalities. The present study was the first study evaluating OHQoL by using two oral patientcentred outcome measures in BD. Moreover, translated Turkish versions of OHIP-14 and OHQoL were also observed to be valid and reliable questionnaires for further studies.

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