

Illness perception amongst individuals with periodontal diseases

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Objective: To describe illness perception among patients with periodontal diseases in relation to socio-demographic predictors, oral signs and symptoms. **Basic Research Design:** Cross-sectional analytical study. **Participants:** Stratified quota sample of 353 consecutive adults with periodontal diseases attending university dental clinics in Iran. **Main Outcome Measures:** The illness perception of periodontal diseases measured using the Brief-Illness Perception Questionnaire. **Results:** Participants' mean age was 38.7 years and 53% were female. The most frequent symptoms were tooth sensitivity, inflamed and painful gingiva, and halitosis. The symptoms that participants associated with periodontal diseases were inflamed and painful gingiva, bleeding while brushing, flossing or eating, and gingival recession. Illness perception was associated with education level, the patient's experience of periodontal symptoms, individuals' attitudes about an association between oral signs and symptoms with periodontal diseases and clinical attachment loss. **Conclusion:** Understanding how patients perceive their disease is a crucial step to motivating and engaging them in periodontal therapy and in the healthcare process.

Keywords: Illness, periodontal diseases, socio-demographic variables, perception

Introduction

Periodontal diseases are among the most prevalent oral conditions that affect 20%–50% of the human population across the world (Hossain *et al.*, 2021) and are an important cause of tooth loss in adults (Lipton *et al.*, 2016). Their high prevalence has made them a public dental health concern (Nazir, 2017).

Although the diagnosis of periodontal diseases is almost entirely based on clinical assessments, patients perceive their disease as an illness. Illness is a mental construct based on a patient's health-related beliefs and attitudes, as well as the information received from society and health professionals (Machado *et al.*, 2020). In other words, the patient organizes patterns of health-related beliefs and attitudes as illness perception. This perception influences the behaviour regarding the management of the disease (Hoving *et al.*, 2010) and psychological well-being (Zoeckler *et al.* 2014).

Patient engagement is a crucial component of periodontal therapy. A patient's non-adherence is a challenging behaviour (Machado *et al.*, 2020) as yet under-investigated in periodontal diseases. The Brief Illness Perception Questionnaire (Brief-IPQ) was developed based on the common-sense model of self-regulation (Moss-Morris *et al.*, 2002). It has acceptable reliability and construct factorial validity in many diseases such as diabetes (Ajuwon and Insel 2022), coronary heart disease (De Bacquer *et al.*, 2022), and dental caries (Mafla *et al.*, 2018).

Previous studies have investigated potential periodontal diseases (Machado *et al.*, 2020; Valente and Vettore, 2018; Vettore and Aqeeli, 2016; Thomson *et al.*, 2012). However, this study is among the first to explore determinants of periodontal perception following diagnosis of periodontal diseases. We sought to describe illness perception among patients with periodontal diseases in relation to socio-demographic predictors, and oral signs/symptoms.

Methods

The protocol of this study were approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1399.159). Data was collected between October 2019 and February 2020.

This study was conducted with volunteers aged 18 years and above that were diagnosed with periodontal diseases. The participants were selected using quota sampling with strata defined as geographical residence locations. The participants were recruited from the dental clinics of Tehran and Isfahan dental schools. Using the multivariate regression option of the PASS 11 software and considering $\alpha = 0.05$, $\beta = 0.2$, and $\rho (R) = 0.1$, the minimum sample size required to evaluate the effect of selected variables was estimated at 168 participants for each location. However, due to the possibility of people leaving the study or other unforeseen cases, 176 patients were recruited.

The inclusion criteria were the presence of periodontal diseases (Tonetti *et al.*, 2018; Caton *et al.*, 2018) (i.e. clinical attachment loss (CAL), bleeding on probing (BOP), tooth loss attributable to periodontitis, bleeding while brushing, flossing or eating, swollen and painful gums, presence of plaque mass, etc. All participants signed informed consent on recruitment. Patients with any systemic disease or medication that could affect their periodontal status, those who were under the influence of or dependent on drugs or alcohol, pregnant women, and patients with any psychiatric, developmental, or degenerative brain disorders that could affect emotional or cognitive functions were excluded. Also, patients with peri-implantitis were not included.

The questionnaire consisted of two parts. The first part enquired about socio-demographic information including age, gender, place of residence, marital status, health insurance, education level, and average monthly income

(categorised lower, middle or upper for analysis based on annual income of <USD2500, USD2501 to USD4999 and >USD5000 respectively). This part also enquired whether participants had experienced oral symptoms and whether they attributed those symptoms to periodontal diseases.

This part contained 10 questions enquiring whether participants had experienced specific symptoms (inflamed and painful gingiva; bleeding while brushing, flossing, or eating; halitosis; gingival recession; tooth sensitivity; toothache; oral dull pain; tooth mobility; loose gingiva; and suppuration since the beginning of their periodontal diseases. Where participants responded that they had experienced the symptom a contingent question asked, "Do you think this symptom is related to your periodontal disease?"

In the second part, participants' illness perception was assessed in face-to-face interviews conducted by the two calibrated examiners using the Persian version of the Brief-IPQ (Weinmann *et al.*, 1996; Bazzazian and Besharat, 2010; Seydi *et al.*, 2021). Brief-IPQ consists of 8 dimensions, including 'consequences' (perceived consequences of the disease), 'timeline-acute/chronic' (perceived timeline of the disease such as acute or chronic), 'personal control' (i.e., individuals' strategies to manage the disease), 'treatment control' (i.e., disease treatment such as taking medication or surgery), 'identity' (i.e., perceived of signs and symptoms), 'illness concern' (levels of worry about the disease) 'emotional representations' (negative feelings related to the disease such as anxiety and anger), and 'illness coherence' (perceived awareness about the disease). Each dimension is answered on a scale from zero to ten. The total score of periodontal perception was calculated by summing the item scores, with reverse scoring of items 3, 4, and 7. A higher total score indicated a higher perceived threat of illness (Machado *et al.*, 2020).

Clinical periodontal assessments were conducted by two calibrated examiners supervised by a periodontist (N.R.). Clinical attachment loss (CAL) and probing depth (PD) were recorded at six sites of all teeth (excluding third molars) using a Williams probe.

The diagnosis of periodontal diseases was based on Tonetti *et al.* (2018) and Caton *et al.* (2018). Rather than categorising the severity of the disease, the mean value of the CAL was calculated per person.

Repeat measurements were used to determine intra-examiner and inter-examiner reproducibility at the site level. Intra- and inter-examiner reliabilities for probing depth and the distance between the CEJ and the free gingival margin were ICC 0.91–0.94 & ≥ 0.80 , and ICC 0.81–0.83 & ≥ 0.75 , respectively.

Descriptive analyses present means for continuous variables and frequencies for categorical variables. Categorical variables were compared using the Chi-square (χ^2) test.

The distribution of the dependent variable (IPQ total score) showed evidence of normality using the Kolmogorov-Smirnov normality test ($p = 0.07$) and on visual examination. Independent variables tested as possible determinants included age, gender, occupation status, place of residence, marital status, income, education level, insurance status, the patient's experience of signs & symptoms related to periodontal diseases, attribution of signs and symptoms to periodontal diseases, and mean CAL. Independent variables were first tested using univariate regression and then entered into a backward

multivariate regression model. Analyses were conducted using IBM SPSS version 26 and α was set at 0.05.

Results

The 353 participants were aged 18 to 66 years (Mean=38.67, SD=12.85). Half (53%) were female, most (73.5%) fell into the low-income category (< 2500\$) and were married (64.5%). Only 22.7% had a high level of education. Half (54%) had insurance coverage and 25% had no insurance (Table 1).

The distribution of periodontal symptoms and the frequency of symptoms associated with periodontitis are shown in Table 2. The most common symptoms were tooth sensitivity, halitosis, and inflamed and painful gingiva. The most frequently experienced symptoms that the participants believed were associated with periodontal diseases were inflamed and painful gingiva, bleeding while brushing, flossing, or eating, and gingival recession.

Participants were more likely to perceive the illness if they had symptoms such as halitosis, toothache, gingival attachment loss, and loose teeth. The symptoms most frequently assumed to be associated with periodontal diseases included gingival recession, painful gingiva, and bleeding while brushing, flossing, or eating. Most participants were unaware that tooth sensitivity and mobility could be attributed to periodontal diseases.

Table 3 shows Brief-IPQR total scores according to socio-demographic characteristics. Participants who were widowed or had lower educational attainment perceived illness more.

In univariate regression age, marital status, education level, attitudes about the association of specific oral signs and symptoms with periodontal diseases, CAL, and individuals' experience of signs/symptoms had a significant effect on illness perception (Table 4).

In multiple regression, occupation, education, experience of symptoms, attitudes about the association of specific oral signs and symptoms with periodontal diseases, and CAL predicted greater periodontal illness perception. The model explained 29% of the variance in illness prediction ($R^2 = 0.29$).

The effect of the education level on illness perception showed that those with lower education levels perceived the illness 3.5 times more severely. Likewise, for one point increase in the experience of dental/periodontal symptoms, the illness perception increased by 2.5 times. A one-point increase in the attribution of dental/periodontal signs, reduced illness perception by 39%. However, subjects with more CAL perceived the illness as more severe (i.e. severity of periodontal perception increased by 11% when the CAL was enhanced by one millimeter (1 mm)).

Discussion

This study described illness perception in patients with periodontal diseases. Lower education, experience of symptoms, attitudes about the association of specific oral signs and symptoms with periodontal diseases, and greater CAL predicted higher perception of illness.

The finding of greater illness perception in people with lower education is consistent with Mafla *et al.*, (2018) who described a similar inverse relationship. Individuals with lower education levels are more likely to experience emotional and physical consequences associated with

Table 1. Characteristics of 353 periodontal patients.

<i>Variable</i>		<i>Total (N=353) %</i>	<i>Residents of Tehran (n=94) %</i>	<i>Residents of Isfahan* (n=200) %</i>	<i>Others** (n=59) %</i>
Gender	Male	47	51.1	43.5	52.5
	Female	53	48.9	56.5	47.5
Occupation status	No job	51.3	48.9	55.5	40.7
	Public employer	3.5	2.1	3.5	5.1
	Private employer	2.5	2.1	2.5	3.4
	Self-employment	33.4	38.3	32.5	28.8
	Retirement	4.5	1.2	6	5.1
	Others	4.8	7.4	0.0	16.9
Marital status	Single	32.3	36.2	33	23.7
	Married	64.3	60.6	64	71.2
	Widow	0.8	0.0	1.5	0.0
	Divorced	2.5	3.2	1.5	5.1
Education	Elementary to high school	36.5	40.4	27.5	61
	Diploma	41.2	38.3	49	18.6
	Bachelor's degree	17.8	16	19.5	15.30
	Master's degree	1.7	0.0	2	3.4
	Doctorate/ higher	2.8	5.3	2	1.7
Health insurance	None	24.6	25.5	26.5	16.9
	Health Services Insurance	8.2	7.5	9	6.8
	Armed Forces Insurance	2	2.2	2.5	0.0
	Social Security Insurance	54.4	57.4	51	61
	Supplemental Iranian Health Insurance	10.8	7.4	11	15.3
Income**	Upper (>USD5000)	0.8	3.2	0.0	1.7
	Middle	16.1	22.3	11.5	22.4
	Lower (<USD2500)	83.1	74.5	88.5	75.9

* Some of Isfahan residents received dental care in general dental clinics of Tehran or were referred to general dental clinics of Tehran.

** Patients who lived in areas other than Tehran and received dental care in the general dental clinics of Tehran and Isfahan.

Table 2. Frequency of symptoms experienced by 353 patients, and reported to be associated with periodontal diseases.

<i>Symptoms</i>	<i>I experienced this symptom, since I have had periodontitis</i>		<i>Do you think this symptom was associated with periodontitis?*</i>	
	<i>Yes (%)</i>	<i>No (%)</i>	<i>Yes (%)</i>	<i>No (%)</i>
Inflamed and painful gingiva	55.5	45.5	62.6	37.4
Bleeding while brushing, flossing, or eating	64.6	35.4	56.4	43.6
Halitosis	56.9	43.1	42.2	57.8
Gingival recession	54.7	45.3	51.8	48.2
Tooth Sensitivity	64.9	35.1	30.6	69.4
Toothache	48.8	51.6	23.2	76.8
Oral dull pain	22.1	77.9	28.9	71.1
Tooth Mobility	19.3	80.7	27.5	72.5
Suppuration	15	85	49.3	50.7
Loose gingiva	24.1	75.9	37.7	62.3

* For participants who had experienced the symptom.

seeking care later, and worse periodontal indices have been demonstrated in this group (Ramírez *et al.*, 2017). Hence, this group is at increased risk of oral disease. Efforts to improve oral healthcare knowledge and provide dental services for people with lower education levels may

lead to initiating periodontal therapy and eliminating signs and symptoms of periodontal diseases in the early stages.

Individuals with symptoms such as dull pain and loose teeth perceived more illness, as is consistent with previous studies (Mafla *et al.*, 2018; Ali *et al.*, 2022). However,

Table 3. Brief-IPQ' total score among 353 periodontal patients.

Variable		Total Score (Mean±SD)	p
Gender	Male	34.4±11.9	0.22
	Female	36.0±12.0	
Occupation status	No job	36.0±12.2	0.17
	Public employee	27.9±8.5	
	Private employee	37.1±12.5	
	Self-employment	34.4±12.5	
	Retirement	38.5±9.4	
	Others	33.2±11.9	
Place of residence	Tehran	36.6±9.9	0.13
	Isfahan	34.1±12.7	
	Others	36.9±11.9	
Marital status	Single	30.4±11.4	<0.001
	Married	37.4±11.6	
	Widow	46.0±11.1	
	Divorced	39.0±9.1	
Education	Elementary to high school	40.4±11.2	<0.001
	Diploma	34.3±11.1	
	Bachelor's degree	28.5±10.2	
	Master's degree	29.8±19.3	
	Doctorate/ higher	28.1±10.6	
Health insurance	None	35.0±11.9	0.69
	Health Services Insurance	37.1±12.3	
	Armed Forces Insurance	29.9±12.6	
	Social Security Insurance	35.2±12.0	
	Supplemental Iranian Health Insurance	35.8±11.8	
Income	Upper-income bracket	35.6±12.1	0.39
	Middle-income bracket	33.2±11.1	
	Lower-income bracket	36.5±17.7	

Table 4. Univariate and Multivariate linear regression analyses for predictors of periodontal illness perception.

Variables	Univariate Regression		Multivariate Regression	
	β (95%CI)	p	β (95%CI)	p
Age	0.39 (0.31, 0.48)	<0.001		
Gender	1.57 (-0.92, 4.08)	0.216		
Occupation status	-0.28 (-1.03, 0.46)	0.448	-0.66 (-1.42, 0.08)	0.081
Place of residence	-0.17 (-2.1, 1.75)	0.859		
Marital status	5.08 (3.08, 7.09)	<0.001		
Income	-2.01 (-5.21, 1.2)	0.220		
Education	-4.51 (-5.77, -3.24)	<0.001	-3.54 (-5.41, -1.63)	<0.001
Insurance status	0.019 (-0.86, 0.91)	0.966		
Experience of signs & symptoms related to periodontal diseases	3.39 (2.82, 3.97)	<0.001	2.57 (1.83, 3.29)	<0.001
Attribution of signs & symptoms to periodontal diseases	-0.55 (-1.05, -0.04)	0.033	-0.61 (-1.2, 0.03)	<0.001
Clinical Attachment Loss (CAL)	0.23 (0.19, 0.26)	<0.001	0.11 (0.06, 0.17)	<0.001

more knowledge about the association between specific oral signs and symptoms with periodontal diseases was associated with lower illness perception. These patients' knowledge of differentiated periodontal signs may have enabled them to manage their disease and utilise the appropriate therapy. Hence, promoting periodontal knowledge

through community-based oral health education may help people to benefit from appropriate therapy.

These data may help understand how patients perceive their disease to motivate and engage them in the treatment. Engaging patients in their health care through increasing oral health literacy, oral hygiene instructions,

and motivational interventions could enhance oral health and periodontal therapy (Machado *et al.*, 2020). Illness perception could be addressed in primary care interventions such as dental check-ups, modification of the contextual risk determinants, and early detection of periodontal diseases.

Like all research, this research has limitations. This study cannot establish causality because of the cross-sectional design. As many of the variables were self-reported, social desirability bias should be considered. Interactions between age and other explanatory variables may lead to evolving different concepts. For example, the effect of household income could have varied if older workers had dental benefits or younger adults had competing costs. The similarities between symptoms of gingivitis and periodontitis and sample size restrictions did not allow differentiation of the impact of these two conditions.

In conclusion, the perception of periodontal diseases as an illness was related to individuals' education, periodontal symptoms, attitudes about associations between specific symptoms and periodontal diseases, and clinical attachment loss. Periodontal practitioners could assess patients' illness perception when designing health promotion programs, and periodontal treatment to understand how patients feel and behave about their disease. More generally, providing basic periodontal health information may facilitate access to appropriate care and improve the early detection and management of periodontal diseases.

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Conflicts

There are no conflicts of interest.

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