

Assessment of Illness Perception of Diabetic Patients with Periodontitis

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Abstract

Illness perception is the organized cognitive representations or beliefs that patients have about their illness. These perceptions are important determinants of behavior and are associated with important illness outcomes. This study aimed to assess the illness perception of diabetic patients with periodontitis toward Diabetes Mellitus and periodontitis and its association with the severity of periodontitis.

A cross sectional prospective study was conducted among total of 22 diabetic patients with periodontitis attending the periodontics Kulliyah of Dentistry (KOD) Polyclinic, International Islamic University Malaysia (IIUM). Periodontal clinical examination was done to the patients and the severity of periodontitis was determined by the clinical attachment loss (CAL). The Brief Illness Perception Questionnaire (B-IPQ) was used to assess illness perception towards Diabetes and periodontitis.

The mean score of illness perception in diabetes mellitus is higher than periodontitis in terms of timeline, personal control, concern, and understanding. The patients that perceive the illness in a serious way in terms of consequences, treatment control, concern, and emotional domain have lower mean CAL. There is significant relationship between gender and illness perception towards Diabetes Mellitus and periodontitis for identity domain where male patients showed p value of 0.04 and 0.032 respectively.

This study showed that patients consider Diabetes Mellitus to be more serious than periodontitis despite the severity of their periodontitis. This highlights the intense need of proper education about the oral complications of Diabetes Mellitus and oral health in general.

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Introduction

The term "diabetes mellitus" is used to identify a group of disorders characterized by elevated levels of glucose in the blood due to a total or relative lack of insulin secretion and insulin resistance or both.¹ Diabetes is associated with microvascular complications such as nephropathy, retinopathy, and neuropathy, and macrovascular complications such as atherosclerosis and stroke.²

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Diabetic patients who do not carefully control their blood glucose levels will be at high risk of systemic and oral complications such as periodontal disease (periodontitis and gingivitis); salivary dysfunction leading to a reduction in salivary flow, changes in saliva composition, and taste dysfunction. Oral fungal and bacterial infections have also been reported in patients with diabetes.³ Periodontitis occurs at a higher rate and severity in diabetic patients.⁴ A study done in Arizona showed that loss of periodontal attachment and bone loss were greater in diabetic versus non-diabetic individuals within different age groups.⁵

Periodontitis is defined as an inflammatory disease of supporting tissues of teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and

alveolar bone with periodontal pocket formation, gingival recession or both.⁶

Illness perceptions are the organized cognitive representations or beliefs that patients have about their illness. These representations are processed in parallel through three stages. Firstly, the individual forms the representation of the illness or health threat and then they adopt behaviors to cope with the illness. Lastly, they appraise the efficacy of these behaviors.⁷

Illness perception can be measured using questionnaire. Illness perception change rapidly in response to diagnostic results and have been associated with emotional distress, recovery and disability as well as treatment-related behavior such as adherence. Furthermore, they can provide a framework for patients to make sense of their symptoms, assess health risk, and direct action during recovery.⁷ Research investigating the role of illness perceptions in medical conditions has grown rapidly in recent years. This has been started initially by the development of scales to reliably measure illness beliefs, such as the Illness Perception Questionnaire (IPQ)⁸ and subsequently by the strong associations found between patients' perceptions of their illness and behavioral outcomes.

Despite the worldwide recognition of the dangers of diabetes mellitus, diabetic patients' awareness of and attitudes toward the risk for oral diseases especially periodontitis has not been fully addressed. Thus, the objectives of the current study was to assess patients' illness perception towards diabetes mellitus and periodontitis, study the association between the illness perception towards periodontitis and towards diabetes and the severity of periodontitis, and investigate the relationship between patients' sociodemographic data and their illness perception towards diabetes mellitus and periodontitis.

Materials and methods

This study is to assess the relationship between illness perception towards diabetes mellitus and periodontitis with the severity of periodontitis and also is to investigate the relationship between patients' sociodemographic data and their illness perception towards diabetes mellitus and periodontitis

Ethical approval was obtained from the IIUM Research Ethics Committee (IREC). The

purpose of the study and the privacy and confidentiality issue were explained to the respondents and they were asked to sign a consent form prior to the participation.

This study was a quantitative, cross-sectional prospective study of patients attending KOD IIUM Polyclinic. A total of 22 Type 2 diabetic patients attending in KOD IIUM Polyclinic were selected purposively depending on the inclusion and exclusion criteria. The inclusion criteria included the patient who have been diagnosed with diabetes mellitus type II by the medical practitioner for at least one year, patient who have been diagnosed with periodontitis, patient not on any antibiotic medications for the last month, both female and male and the patient able to give written consent. While patients who were pregnant, smokers, having gingivitis and edentulous were excluded from the study.

The Brief Illness Perception Questionnaire (B-IPQ) was translated into Malay language by using two ways translation (forward and backward) after obtaining the approval from the Illness Perception Questionnaire author.

First of all, all patients were given a brief explanation about the research and assigned a written consent prior to participation. Then, the patients were given the Brief Illness Perception Questionnaires (B-IPQ) regarding illness perception towards diabetes mellitus and periodontitis respectively. Also, the patients were asked to fill the patient data questionnaire that included the patients' sociodemographic data such as gender, age, race, marital status etc.

After the patients were done answering the questionnaires given, a clinical examination was conducted. First, a random blood sugar test was conducted to measure patient's blood sugar level. Patients with controlled diabetes should have a level of random blood sugar of less than 8.5mmol/L.⁹ Then, clinical periodontal examination was conducted which included Basic Periodontal Examination (BPE), Clinical Attachment Loss (CAL), and Probing Pocket Depth (PPD). All these clinical parameters were conducted using the clinical periodontal charting provided in the KOD IIUM Polyclinic. All these clinical procedures were supervised and approved by Periodontist specialists.

The Brief Illness Perception Questionnaire (Brief IPQ) uses a single-item scale approach to assess perceptions on a continuous linear scale, psychometric properties

and the value using samples from several illness groups.

The Brief IPQ consists of eight items were rated on an 11-point (0-10) end-defined response scale. Five of the items assessed cognitive illness representations: “consequences” (Item 1), “timeline” (Item 2), “the degree of personal control over the disease” (Item 3), “treatment control” (Item 4), and “identity” (Item 5). Two of the items assessed the emotional representations: “concern” (Item 6) and “emotional response” (Item 8), while one item assessed “illness understanding” (Item 7). High scores were gained on these domains represent strongly-held beliefs about more serious consequences of the illness (Item 1), its more pronounced chronic nature (Item 2), stronger positive beliefs in controllability of the illness (Item 3 and 4), a greater number of symptoms attributed to the illness (Item 5), a higher level of patient's emotional distress arising from the illness (Item 6 and 8), and better personal understanding of the illness (Item 7). The results from the scale can be easily scored and are readily interpretable by researchers and clinicians. It allows very simple interpretation of scores, has good test–retest reliability. Evidence shows the Brief IPQ to be a valid and reliable measure of illness perceptions in a variety of illness groups and easy to be understood and completed by the patients⁸

Scoring of the questionnaires was done by taking the mean score of the patients' response to each domain which is comprised of one question an answer of above 5 means the patient perceives this aspect of the illness seriously.

Also a total score was obtained by adding up the response to each of the eight questions with questions 3,4and 7 reversed before adding them to the score. The total score is then divided by 8 and the resultant number reflects how seriously the patient perceives the illness. A mean score of above 5 indicates that the patient perceives the illness in a serious way.

Statistical analysis

All the data obtained from the study were processed and analyzed by means of statistical package for social science version 22.0 (SPSS ver.22.0). We used the statistical package for social sciences program, version 22.0 SPSS 22.0 for analyzing the data. The analysis for the sociodemographic data were presented in

numbers and percentages, the mean scores were obtained for assessment of the different domains of illness perception towards diabetes and periodontitis. Mann-Whitney U test and Kruskal-Wallis test were used to determine the association between the important sociodemographic characteristics with the illness perception towards diabetes and periodontitis and also to assess the association between illness perception towards periodontitis and the severity of periodontitis. The association between the parameters of Diabetes Mellitus and the illness perception towards Diabetes Mellitus were assessed using Pearson Chi-square test followed by Fisher's exact test. A *p* value of less than 0.05 was considered as statistically significant.

Results

B-IPQ Domains	Illness Perception (Diabetes Mellitus) Mean score (SD)	Illness Perception (Periodontitis) Mean score (SD)
Consequences	5.1 (3.3)	6.61(3.07)
Timeline	7.1(3.2)	5.4(3.07)
Personal control	6.3(2.7)	5.72(2.86)
Treatment control	8.16(2.68)	8.1(2.47)
Identity	4.6(3.07)	5.0(2.30)
Concern	8.0(2.47)	7.0(3.48)
Understanding	8.5(2.2)	6.38(3.72)
Emotional	2.55(2.2)	3.6(3.01)

Table 1. Showing the mean scores of the BIPQ domains towards Diabetes Mellitus and Periodontitis.

B-IPQ Domains	Illness Perception (Diabetes Mellitus)		Illness Perception (Periodontitis)	
	Serious N (%)	Not serious N (%)	Serious N (%)	Not serious N (%)
Consequences	7 (31.8)	15 (68.2)	14 (63.6)	8 (36.4)
Timeline	12 (54.4)	10 (45.5)	8 (36.4)	14 (63.6)
Personal control	3 (13.6)	19 (86.4)	6 (27.3)	16 (72.2)
Treatment control	3 (13.6)	19 (86.4)	1 (4.5)	21 (95.5)
Identity	7 (31.8)	15 (68.2)	9 (40.9)	13 (59.1)
Concern	18 (81.8)	4 (18.2)	15 (68.2)	7 (31.8)
Understanding	1 (4.5)	21 (95.5)	5 (22.7)	17 (77.3)
Emotional	2 (9.1)	20 (90.9)	8 (36.4)	14 (63.6)
Overall illness perception	4 (18.2)	18 (81.8)	9 (40.9)	13 (59.1)

Table 2. Showing the rate of perceiving each domain of B-IPQ for both diabetes and periodontitis as a serious illness.

Table 1 shows the mean scores for each of the domains of the B-IPQ towards diabetes and periodontitis. The mean score of illness perception in diabetes mellitus is higher than

periodontitis in terms of timeline, personal control, concern, and understanding. Meanwhile, for the other B-IPQ domains; consequences, identity and emotional, the mean score for illness perception in diabetes mellitus is lower than the periodontitis.

In table 2, for diabetes mellitus, more than 50% of the patients perceive the illness in a serious way in terms of timeline and concern while the other domains show percentage more than 50% of the patient perceive the illness not in a serious way. Meanwhile, for periodontitis, 63.6% and 68.2% of the patients perceive the illness in a serious way in terms of consequences and concern respectively and low percentage for the other domains.

B-IPQ Domains to periodontitis	Mean of clinical attachment loss (CAL)	P value
Consequences		
Perceived serious	7.14	0.033
Not serious	9.05	
Timeline		
Perceived serious	7.6	0.78
Not serious	7.9	
Personal control		
Perceived serious	9.02	0.10
Not serious	7.4	
Treatment control		
Perceived serious	5.8	0.33
Not serious	7.9	
Identity		
Perceived serious	8.5	0.22
Not serious	7.4	
Concern		
Perceived serious	7.5	0.76
Not serious	8.0	
Understanding		
Perceived serious	9.0	0.1
Not serious	7.5	
Emotional		
Perceived serious	7.4	0.47
Not serious	8.1	
Overall perception		
Perceived serious	7.5	0.49
Not serious	8.1	

Table 3. The association between the perceived seriousness of the illness and the severity of Periodontitis.

Table 3 represents the association between the illness perception toward periodontitis with the severity of periodontitis. The severity of the periodontitis is showed by the mean clinical attachment loss (CAL) for each domain. As can be seen in Table 3, the patients that perceive the illness in a serious way in terms of consequences, concern, treatment control and emotional domain have lower mean CAL compared to those who are not perceived serious.

	Perceived serious N(%)	Perceived not serious N(%)	P- Value
With diabetic complications	1 (12.5)	7 (87.5)	0.47
No complication of DM	3 (21.4)	11(78.6)	
Controlled diabetes	2 (10.5)	17(89.5)	0.019
Uncontrolled diabetes	2(66.7)	1(33.3)	
Duration <5years	1(11.1)	8(88.9)	0.47
Duration >5 years	3(23.1)	10(76.9)	
Regular check up	2(11.8)	18(88.2)	0.15
No regular check up	2(40)	3(60)	

Table 4. Comparison between Diabetes Mellitus parameters and illness perception towards Diabetes Mellitus.

Regarding the comparison between Diabetes Mellitus parameters and illness perception towards Diabetes Mellitus in table 4, 89.5% of patients with controlled diabetes perceived the illness not serious compared to 33.3% of patients with uncontrolled diabetes, $p=0.019$.

Illness Perception (DM)	Gender		P value	Education		P value	Occupation		P value	Income		P value
	Male	Female		High	Low		Employed	Unemployed		<RM 2000	≥ RM 2000	
Consequences	4.46	4.5	0.95	4.6	5.3	0.69	5.12	5.10	0.98	4.6	5.75	0.48
Timeline	6.0	6.8	0.56	6.8	7.23	0.80	7.0	7.20	0.89	6.4	8.0	0.27
Personal control	6.2	6.62	0.57	6.4	6.38	0.99	7.37	5.6	0.18	6.5	6.25	0.85
Treatment control	7.3	7.6	0.79	7.2	8.53	0.35	8.12	8.20	0.95	8.90	7.25	0.24
Identity	5.3	3.0	0.04	5.4	4.3	0.51	4.87	4.4	0.75	4.4	4.87	0.75
Concern	8.3	7.1	0.28	8.2	7.9	0.83	8.25	7.8	0.71	7.9	8.12	0.85
Understanding	8.4	8.3	0.89	8.4	8.53	0.90	8.25	8.70	0.68	8.6	8.37	0.83
Emotional	3.0	2.22	0.38	2.8	2.5	0.78	2.75	2.4	0.74	2.7	2.37	0.76

Table 5. Showing the relationship between sociodemographic factors and the mean scores of the illness perception domains towards Diabetes Mellitus.

Illness Perception (Periodontitis)	Gender		P value	Education		P value	Occupation		P value	Income		P value
	Male	Female		High	Low		Employed	Unemployed		<RM 2000	≥ RM 2000	
Consequences	6.3	6.6	0.79	7.0	6.3	0.65	6.4	6.5	0.94	6.0	7.1	0.40
Timeline	5.2	5.22	0.99	3.6	5.7	0.15	5.3	5.1	0.91	4.8	5.7	0.46
Personal control	5.1	6.0	0.43	6.6	5.1	0.28	5.4	5.5	0.93	4.4	4.6	0.86
Treatment control	8.2	7.8	0.74	9.2	7.7	0.24	8.1	8.0	0.98	7.6	8.7	0.26
Identity	5.8	3.7	0.032	5.4	4.8	0.66	5.3	4.7	0.58	4.8	5.2	0.71
Concern	7.0	7.3	0.81	8.0	6.8	0.49	7.4	6.9	0.73	7.0	7.2	0.91
Understanding	6.5	6.6	0.89	6.6	6.5	0.96	7.2	6.0	0.42	3.8	2.8	0.52
Emotional	3.7	3.5	0.92	4.2	3.4	0.66	4.0	3.3	0.63	3.2	4.2	0.52

Table 6. Showing the relationship between sociodemographic data and mean score of the illness perception domains towards periodontitis.

Table 5 shows there is significant relationship between gender and illness perception towards Diabetes Mellitus for identity domains ($p=0.04$). Meanwhile, for personal control domain, the employed patients scored a higher mean score of 7.37 compared to 5.6 for unemployed patient.

As for table 6, there is also significant relationship between gender and illness perception towards periodontitis for identity domain with p value of 0.032. It shows male patients have higher mean score with 5.8 than female patients with mean score of 3.7. Other than that, patients with lower education level scored higher in the timeline domain with mean score of 5.7 compared to those with higher education with mean score of 3.6. Besides, the mean scores of patients with higher income are 8.7 and 7.6 for lower income in terms of treatment control domain.

Discussion

When patients are diagnosed with an illness they generally develop an organized pattern of beliefs about their condition. Patients build models of their illness based on previous personal or family experiences with their disease or information they may have received from medical staff or the general media. These illness models may be specific to the individual and may differ considerably from those of the clinicians giving treatment.¹⁰ These views are key determinants of behavior directed at managing illness. It is a dynamic process which changes in response to shifts in patients' perceptions and ideas about their illness. These illness perceptions or cognitive representations directly influence the individual's emotional response to the illness and their coping behavior such as adherence to treatment.¹¹ Moreover, if the patients have a better illness perception, they will become more aware and know about their illness thus they will more comply with the treatment and this consequently will give a better outcome of the treatment.

Apart from that, the relationship between beliefs about illness and health-related outcomes has been widely studied and illness perceptions are accepted as generically important to patient behavior and outcomes.¹²

Addressing illness perception early on with patients provides the opportunity to

improve the concordance between doctor and patient beliefs and can achieve significant positive influences on a wide range of outcomes from patient anxiety to perceived understanding of information provided.¹³

Previous study revealed that most of diabetic patients have less knowledge about the oral complications such as periodontal disease. Diabetic patients have more knowledge about their increased risk for systemic complications associated with diabetes than they do for oral and dental complications and they have limited knowledge of association between oral health and overall health.¹⁴ Other than that, participants considered oral health to play an important role in relation to general health and believed the same attention should be paid to oral health problems as to other general health problems.¹⁵ According to another study, longer diabetes duration, higher FBG and poorer scores of compliance to self-management of diabetes were positively related to poorer scores on periodontal health parameters in multiple linear regression analysis.¹⁶

This current study highlights that diabetic patients are more aware about the chronicity of diabetes than periodontitis which means they will probably adhere to treatment of diabetes more than periodontitis. Plus they scored higher in terms of concern and understanding domain towards diabetes mellitus compared to periodontitis. This is because the patients have more exposure regarding the general health knowledge compared to the oral health. Apart from that, the patient is less aware about the strong relationship between the diabetes manifestation and also complications to the oral health. This is supported by a study conducted by Eldarat in United Arab Emirates (UAE), it was found that diabetic patient have more knowledge about their complications associated with diabetes mellitus than they do for oral and dental complication.¹⁴

Besides, patients also adopt timeline beliefs about their condition, usually ranging from acute to chronic. In this study, in terms of timeline domain, it shows high percentage of patient perceived their diabetic illness in a serious way while for periodontitis; it shows 63.6% of the patients perceive that illness not a serious way. This suggest that patients have a belief that diabetes is a chronic disease but not for periodontitis. Timeline beliefs have important associations with medication taking. Patients with acute models of their illness are more likely to abandon their medicines and other treatments before patients with more chronic perceptions.¹¹ While in terms of concern domain, both illnesses show high percentage of patient perceive the illness in a serious way. This reveals that they are aware and concern more towards both illnesses.

Other than that, illness perceptions are increasingly being shown to be related to important outcomes in a number of illnesses.¹¹ In this study, there is significant relationship between the illness perceptions and the severity of the periodontitis. Among all the domains, the patients who perceived the periodontitis seriously in terms of consequences were found to have a significantly lower mean CAL which means that patients who are aware about the serious consequences of periodontitis will be more careful about follow up of their condition and follow the oral hygiene instructions. While those who consider the consequences of periodontitis as not serious they are more prone to neglect themselves making them more susceptible to severe periodontitis.

Consequences domain basically encompasses the effect of the illness to have on their work, family, lifestyle, and finances. In many ways, the patient's view of the consequences of their illness reflects the subjectively perceived severity of the condition, which may bear little relation to the objective clinical markers of disease severity.¹¹

Besides that, concern and emotional domains also showed patients that perceived their illness seriously have lower mean CAL compared to those who are not. This may be due to the fact that the more concerned and emotionally affected the patient is, the more he or she will seek the medical help.

Regarding personal control, those who perceived serious meaning that they feel they have less control. Personal control is important in some illnesses as they can influence the types of treatments that patients seek for their condition or the changes they make to control their illness in a logical way. In this study, the patient that perceived serious in personal control revealed to have a higher mean CAL indicating a worse condition since they feel less control over their illness.

Meanwhile for understanding domain, patients who perceived serious they have poor understanding of the illness and showed a higher CAL than those who have better understanding of the illness although it is not significant. Patient's understanding can modify a patient's perception of his or her illness. If the patient is given a clear explanation or illustration of how the treatment helps, it thereby strengthens the patient's understanding of the need and importance to comply with the prescribed treatment.

The patients with controlled diabetes perceived the illness less severe than the patients with uncontrolled diabetes may be due to the fact that they are in good control of the illness and so they score well in the domains of personal and treatment control which will favor the total illness perception score to 'perceived not serious'. The data of present study seems to suggest that there is no enough proper diabetic health education and promotion at the health clinics and hospitals.

The current study demonstrates that male diabetic patients perceived their illness regarding Diabetes Mellitus seriously in terms of identity. Meaning that males tend to

experience more symptoms from their illnesses so they may recognize the illness much better compared to female patients. Employed patients showed better personal control toward Diabetes Mellitus which may be due to being more organized and oriented about themselves than the unemployed and also maybe because they have more resources so they feel in better control.

Nevertheless for periodontitis, we did not find much association between the sociodemographic factors and illness perception except for the identity domain where high educated patients scored higher than low educated patients and the treatment control being higher in high income patients. These findings reflect that periodontitis is generally not well understood by patients.

There are several clinical implications from the study review which include:

- 1) a lack of awareness of oral complications among both diabetics and health providers;
- 2) an understanding of the way diabetes affects oral health is necessary for both clinicians and patients, therefore research in this field should be encouraged;
- 3) the need for regular follow-up of patients with diabetes mellitus by both dentist and physicians;
- 4) the major role that dentists should play in recognising the signs and symptoms of diabetes and their oral complications;
- 5) advice and counseling for diabetic smokers regarding smoking cessation, and
- 6) vigorous treatment of oral infection either bacterial or fungal in these patients, especially if they have poor glycaemic control.¹⁷

Conclusions

This study showed that patients consider Diabetes Mellitus to be more serious than periodontitis despite the severity of their periodontitis. This highlights the intense need for proper education about the oral complications of Diabetes Mellitus and

oral health in general, so that the diabetic patients will be more aware about their oral health not just the systemic complications.

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Declaration of Interest

The authors report no conflict of interest.

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