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A study on the current situation and influencing factors of disease fear in patients with type 2 diabetes mellitus

Chen Ting

Xi'an Fanyi University, Xi'an, China

Abstract: *In recent years, the incidence of type 2 diabetes mellitus has been increasing with lifestyle changes and population aging, and it has become an important public health problem worldwide. Exploring the current status of fear of disease and its influencing factors in patients with type 2 diabetes mellitus is of great significance for developing effective interventions and improving the quality of life. In this study, fear of illness and its influencing factors were assessed by a cross-sectional survey of 375 hospitalized patients with type 2 diabetes mellitus using the Fear of Disease Progression Simplified Scale, the Social Support Scale, and the Simple Illness Perception Scale. The results showed that age, education level, healthcare burden, treatment modalities, sources of health information and social support significantly influenced fear of disease. The study pointed out that comprehensive intervention strategies, including improving disease perception, reducing medical burden, simplifying treatments, and enhancing health education and social support, are important in reducing fear of disease in patients with type 2 diabetes mellitus.*

Keywords: *type 2 diabetes mellitus, fear of disease progression,influencing factors*

1. Introduction

Diabetes mellitus is a lifelong disease characterized by persistent hyperglycemia and caused by multiple factors[1]. By the end of 2021, the number of adults with diabetes worldwide reached 537 with China leading the world in the number of patients. In China, the prevalence of diabetes is 10.4% people over 18 years of age, of which 85% to 95% are type 2 diabetes mellitus (T2DM.) Patients with T2DM are susceptible to a wide range of cardiovascular, cerebrovascular, and microvascular complications in managing their condition, which can lead to disability or death. Fear of disease progression (FoP) is one of the major stressors faced by patients with diabetes, and excessive FoP may lead to decreased compliance and even abandonment of treatment[2]. Existing studies have shown that reducing self-perceived burden and enhancing perceived social support can effectively improve FoP. FoP studies on T2DM patients are rare in China, and given the characteristics of chronic non-communicable diseases, it is particularly important to specialize in FoP in this condition[3]. This study explored the current status and influencing factors of FoP in patients with T2DM through a cross-sectional survey, aiming to provide clinical healthcare professionals with strategies and suggestions to alleviate patients' FoP.

2. Information and Methods

2.1 General information

A convenience sampling method was used to select 375 patients with type 2 diabetes mellitus hospitalized in the Department of Endocrinology of the hospital with an age range of 18 to 88 years and mean age of 56.40 years (standard deviation 13.37 years). The study has been approved by the Ethics Committee of the hospital (Ethics Approval No. 2021-094).

2.2 Inclusion and exclusion criteria

Inclusion criteria included (1) diagnosed with type 2 diabetes mellitus according to the diagnostic criteria of the Chinese Guidelines for the Prevention and Control of Type 2 Diabetes Mellitus (2020

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edition); (2) aged 18 years and above; (3) conscious and able to communicate in normal language; and (4) voluntarily participated in the study and had signed an informed consent form.

Exclusion criteria included (1) having a history of psychiatric disorders or cognitive impairment; (2) type 2 diabetic patients suffering from combined pregnancy or malignant tumors.

2.3 Methods

This study adopts Common Sense Model (CSM), which is a model that regulates behavior based on patients' knowledge of their own disease. The model was proposed by foreign scholars Mc Andrew LM et al. It aims to explain how patients self-regulate through cognitive and emotional responses when facing disease threats and stimuli. The present study combines a literature review and is based on this model to explore the fear of disease progression and its influencing factors in patients with type 2 diabetes mellitus through the argumentation of a team of experts. The expert team consisted of two diabetes specialists and nurses, a clinical psychiatric psychologist and nurse, and a clinical management and nursing education specialist. For the study, the author received specialized training on the purpose of the study, the content of the questionnaire, and the steps of the research. Prior to the survey, the author explained in detail to the participants the purpose, content, and time required for the study, and ensured the confidentiality of the information collected. After obtaining informed consent from the participants, the questionnaires were distributed on site and instructed to be filled out. For questionnaires that were incomplete, unclear or logically inconsistent, the author would promptly verify them on site. A total of 390 questionnaires were distributed in this study, and after excluding 15 invalid questionnaires, 375 valid questionnaires were obtained, with a validity rate of 96.15%.

2.4 Observation indicators

2.4.1 Basic information questionnaire

The form is designed to collect demographic and disease-related information about the participants, including age, gender, marital status, education level, place of residence and healthcare burden[4]. Disease information covered sources of health information, treatment modalities, blood glucose monitoring, surgical experience and number of complications. The questionnaire was designed by the research team and the final version of the questionnaire was confirmed through expert panel discussion and on-site feedback with unanimous opinions.

2.4.2 Fear of Disease Progression Simplified Scale (Fop-Q-SF)

The 12-item simplified version of the scale developed by Menhert A et al. in 2006 covers both physical health and social-family dimensions and is scored on a 5-point Likert scale with a total score range of 12 to 60. Higher scores indicate greater fear of disease progression in patients. The score range was 12 to <23 points for mild fear, 23 to <37 points for moderate fear, and 37 to 60 points for severe fear. A total score of ⩾34 indicates that the patient may have psychological dysfunction. The Chinese version of the scale was conducted by Wu Qiyun et al. The Cronbach's α coefficient in this study was 0.861.

2.4.3 Social Support Scale (SSRS)

The scale, developed by Xiao Shuiyuan in 1986, consists of three dimensions, objective support, subjective support, and support utilization, with a total of 10 items and scores ranging from 12 to 66. 12 to <23 indicates less social support, 23 to <45 indicates average social support, and 45 to 66 indicates more social support. The Cronbach's alpha coefficient for this scale in this study was 0.771.

2.4.4 Brief Illness Perception Scale (BIPQ)

Compiled by Broadbent E et al. based on previous studies, it contains 9 entries divided into cognitive, emotional and comprehension dimensions. Entries 1 to 8 were scored on a Likert scale from 0 to 10, and entry 9 was an open-ended response, with entries 3, 4, and 7 being reverse scored. The total score ranges from 0 to 80, with higher scores indicating a greater perceived threat of illness by the patient. In this study, the Cronbach's alpha coefficient for this scale was 0.618.

2.4.5 Statistical methods

SPSS 26.0 software was used to analyze the data in this study. For count data, frequency (n) and percentage (%) were used for description and chi-square test was applied for comparison. For the measured data that conformed to normal distribution, one-way analysis was performed using t-test,

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ANOVA, and one-way linear regression. In addition, multiple linear regression analysis was used to explore the multiple factors affecting patients' fear of disease progression[5]. The level of statistical significance was set at a P value of less than 0.05.

3.Results

3.1 Univariate analysis of Fo P in patients with type 1 diabetes mellitus

Table 1 Results of univariate analysis of Fo P in diabetic patients

Category	Subcategory	Sample Size (n)	FoP Score [(mean ± SD), points]	t/F Value	P Value
Age (years)	18-<45	78	29.88 ± 8.92	6.998	0.001
	45-<60	133	32.07 ± 10.75		
	60-88	164	34.65 ± 8.92		
Gender	Male	180	32.24 ± 10.48	-0.910	0.363
	Female	195	33.17 ± 9.07		
Education Level	Below Elementary	41	36.32 ± 7.85	6.611	<0.001
	Junior High	89	35.03 ± 10.17		
	High School/Vocational	120	32.47 ± 10.14		
	College and above	125	30.20 ± 9.00		
Marital Status	Single	26	30.15 ± 6.32	2.8134	0.049
	Married	293	32.68 ± 10.18		
	Widowed	37	32.95 ± 9.02		
	Divorced	19	36.47 ± 7.79		
Employment Status	Employed	132	30.45 ± 9.69	-3.363	0.010
	Unemployed	243	33.96 ± 9.61		
Residence	Urban	328	32.21 ± 9.53	-2.720	0.007
	Rural	47	36.32 ± 10.74		
Medical Burden	No Burden	56	25.86 ± 8.43	24.918	<0.001
	Minimal Burden	111	29.82 ± 9.13		
	Some Burden	172	36.17 ± 8.66		
	Heavy Burden	36	35.89 ± 10.43		
Health Information Source	Medical Personnel	227	34.19 ± 9.68	2.357	0.019
	Other	148	31.77 ± 9.73		
Treatment Type	None	4	31.00 ± 11.49	25.992	<0.001
	1-2 Treatments	149	28.58 ± 7.70		
	More than 3	222	35.57 ± 10.00		
Medication Concerns	Not Concerned	62	29.35 ± 12.32	14.965	<0.001
	Slightly Concerned	122	29.61 ± 7.74		
	Generally Concerned	82	34.77 ± 8.13		
	Very Concerned	109	36.59 ± 7.62		
Blood Sugar Monitoring	Yes	177	31.44 ± 9.17	-2.434	0.015
	No	198	33.88 ± 10.16		
Complications (number)	0	143	29.57 ± 10.05	7.264	<0.001
	1-2	134	33.22 ± 9.10		
	More than 3	98	36.72 ± 8.65		
Surgery	Yes	41	35.56 ± 8.50	3.347	0.001
	No	334	31.83 ± 9.00		
Social Support	Total Score	36	32.73 ± 9.77	-2.774	0.006
	Subjective Support	88	32.73 ± 9.77	-4.251	<0.001
	Objective Support	129	32.73 ± 9.77	-4.256	<0.001
	Utilization of Support	122	32.73 ± 9.77	-4.232	<0.001
	Total Social Support Score	22.34 ± 6.60	32.73 ± 9.77	-2.774	0.006
Disease Perception	Total Score	32	32.73 ± 9.77	10.490	<0.001
	Cognition	151	32.73 ± 9.77	11.052	<0.001
	Emotion	124	32.73 ± 9.77	8.433	<0.001
	Understanding	68	32.73 ± 9.77	0.382	0.703

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The analysis in Table 1 shows the effect of several factors on fear of disease progression (FoP) score in diabetic patients. Age was positively correlated with FoP scores, with the 18 to 45 years group scoring 29.88±8.92, while the 60 to 88 years group had the highest score of 34.65±8.92, indicating that fear of disease progression increases with age. Gender did not show significant difference in this analysis with FoP scores of 32.24±10.48 and 33.17±9.07 for males and females respectively.

Literacy level had a significant effect on FoP, the lower the level of education, the higher the FoP score. The highest score of 36.32±7.85 was found in the group with education level below elementary school.The working status significantly affected the FoP scores, with higher scores for those who were not working (33.96±9.61), which may reflect the greater concern about illness among those who were unemployed or retired.

Place of residence was also an influential factor, with urban residents having lower FoP scores (32.21±9.53) and rural residents having higher scores (36.32±10.74). Healthcare burden greatly influenced FoP scores, with those with no burden at all scoring the lowest (25.86±8.43) and those with some burden scoring the highest (36.17±8.66).

Diversity of treatment modalities increased the FoP score, with patients who received more than three treatment modalities having a FoP score of 35.57±10.00, much higher than those who received a few treatment modalities. Also, the level of medication worry was positively correlated with the FoP score, with the more worried patients having higher FoP scores. The number of complications was also positively correlated with the FoP score, with patients with no complications having the lowest score (29.57±10.05) and those with more than three complications having the highest score (36.72±8.65).

These results suggest that the FoP of diabetic patients is influenced by a variety of factors, including age, education level, occupational status, residential setting, healthcare burden, and treatment complexity and presence of complications. Understanding these factors can help healthcare providers more effectively address patients' fears of disease progression, thereby improving their overall management and quality of life[6].

3.2 Multifactorial analysis of fear of disease progression in patients with type 2 diabetes mellitus

Stepwise multiple linear regression analysis was utilized to further explore the key factors influencing fear of disease progression (FoP) in patients with type 2 diabetes. For this analysis, all variables that showed statistical significance in the univariate analysis were selected as independent variables, while the patient's FoP score served as the dependent variable. The inclusion criterion used for the analysis was $\alpha=0.05$ and the exclusion criterion was $\alpha=0.10$. The relevant results are demonstrated in Table 2.

Table 2 Multiple regression analysis of factors influencing fear of disease progression (Fo P) in diabetic patients

Variable	Regression Coefficient	Standard Error	Standardized Coefficient	t Value	P Value	95% CI Lower Limit	95% CI Upper Limit
Constant	13.221	2.498		5.292	<0.001	8.308	18.133
Disease Perception	0.245	0.037	0.314	6.598	<0.001	0.172	0.318
Medical Burden	2.147	0.530	0.190	4.049	<0.001	1.104	3.190
Treatment Type	1.743	0.410	0.186	4.250	<0.001	0.937	2.550
Health Information Source	-3.157	0.847	-0.158	-3.729	<0.001	-4.821	-1.492
Objective Support	-0.382	0.145	-0.115	-2.642	0.009	-0.666	-0.098
Number of Complications	0.646	0.278	0.109	2.322	0.021	0.099	1.194
Age	0.042	0.042	0.057	0.998	0.319	-0.040	0.124
Marital Status	-0.687	0.739	-0.042	-0.930	0.353	-2.141	0.767
Education Level	-0.336	0.413	-0.043	-0.814	0.416	-1.148	0.476
Employment Status	-0.518	1.137	-0.025	-0.456	0.649	-2.753	1.717
Residence	2.577	1.265	0.088	2.037	0.042	0.089	5.065
Medication Concerns	0.607	0.433	0.067	1.402	0.162	-0.245	1.458
Blood Sugar Monitoring	0.904	0.870	0.046	1.039	0.300	-0.807	2.615
Surgery	0.116	1.376	0.004	0.085	0.933	-2.589	2.822

The results of the multiple regression analysis in Table 2 reveal the key factors influencing fear of disease progression (FoP) in patients with type 2 diabetes. Disease perception, healthcare burden, and

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treatment modalities were significant predictors of higher FoP scores, whereas health information sources and objective support were negatively correlated with FoP scores, suggesting that they may contribute to the reduction of patients' fear.

Specifically, disease perception had the most significant effect on FoP, with a regression coefficient of 0.245, suggesting that the higher the patient's perception of disease, the stronger his or her fear of disease progression. The regression coefficient for medical burden was 2.147, indicating that an increase in medical burden significantly increased FoP scores, reflecting the fact that financial pressure may exacerbate patients' fears. In addition, the diversity of treatment modalities (regression coefficient 1.743) also significantly increased FoP, possibly because multiple treatment modalities made patients feel sicker[7].

The regression coefficient for health information sources was -3.157, showing that access to information from medical personnel significantly reduced patients' FoP scores, implying the importance of good communication and transparent information exchange in alleviating patients' fears. The negative regression coefficient (-0.382) for objective support (e.g., support from family and friends) also suggests that social support is an effective resource for alleviating FoP.

These results emphasize the importance of intervening in clinical practice to address patients' perceptions of the disease, reduce their healthcare burden, and provide stable social support to effectively manage and reduce fear of disease progression in patients with type 2 diabetes.

4. Discussion

4.1 Current analysis of fear of disease progression in patients with type 2 diabetes mellitus

Fear of disease progression (FoP) in patients with type 2 diabetes mellitus is influenced by a variety of factors, and this fear involves not only concerns about future health status, but also worries about the complexity of treatment and possible complications. As can be seen from the data in this study, age, education level, financial burden, complexity of treatment modalities, and adequacy of social support are all important factors influencing patients' FoP. In particular, higher healthcare burden and multiple treatment modalities significantly increased patients' FoP scores, reflecting the fact that financial pressure and perceived severity of the condition are important sources of patients' fear[8].

In addition, the source of health information significantly influenced FoP scores. Information received from medical staff significantly reduced patients' fear, suggesting that transparent and reliable health information is key to reducing patients' psychological burden. This emphasizes the importance of the healthcare system's role in providing information and communication, especially in chronic disease management.

Objective social support such as help from family and friends is also very effective in alleviating FoP, suggesting that the involvement of the entire social support system is indispensable in the treatment and management of type 2 diabetes. Therefore, for clinical staff, understanding patients' social and psychological backgrounds, providing comprehensive disease education and psychological support, and facilitating effective communication between patients and family members are key strategies for improving patients' management of the disease and alleviating their fears[9]. These measures will help patients to better cope with the challenges posed by the disease, thereby improving their quality of life and treatment adherence.

4.2 Fear of disease progression in patients with type 2 diabetes mellitus is influenced by multiple factors

This study revealed key factors affecting fear of disease progression (FoP) in patients with type 2 diabetes mellitus through multiple linear regression analyses, including disease perception, healthcare burden, types of treatment modalities, sources of health information, objective support, and number of complications. All of these factors independently influenced FoP, with the effect of disease perception being particularly significant, indicating that the depth and breadth of patients' perceptions of the disease were directly associated with their fear of disease progression. A high disease perception score (53.31 ± 12.51) suggests that the more a patient knows about the disease, the more worried he or she may be about his or her future health.

Healthcare burden as a positive influence on FoP highlights the role of economic stress in disease

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management. As the disease progresses, the increasing cost of treatment significantly increases the psychological burden of patients. At the same time, it was found that increased complexity of treatment modalities also elevated FoP, especially for patients requiring multiple treatments, including insulin injections[10].

Objective support showed its positive role in reducing fear of illness. Lower objective support was associated with higher FoP scores, suggesting that lack of social support may exacerbate patients' fear of disease progression. Therefore, strengthening the patient's social support network, such as family, friends, and fellow patient groups, is necessary to manage the patient's psychological state. In addition, the negative impact of health information sources demonstrates the importance of transparent and reliable information delivery in mitigating patients' FoP. Healthcare professionals should ensure that patients receive adequate and easily understandable disease-related information to minimize fear and uncertainty.

5. Conclusion

In this study, the current status of fear of disease progression (FoP) and the factors affecting it were analyzed in detail through a survey of 375 patients with type 2 diabetes mellitus. The results of the study showed that the mean FoP score of patients with type 2 diabetes was 32.73 ± 9.77, which was a moderate level, and 46.1% of them showed psychological disorders with FoP scores $\geqslant 34$. Multiple linear regression analysis showed that disease perception, medical burden, treatment modality, health information sources, objective support, and number of complications significantly influenced patients' FoP, explaining 35.7% of the psychological variability in patients' FoP.

First, disease perception had the most significant effect on FoP. The depth and breadth of a patient's disease perception was directly associated with his or her fear of disease progression. High disease perception scores indicate that the more a patient understands the disease, the more worried he or she may be about his or her future health. To address this point, clinical staff should help patients correctly understand the disease and reduce unnecessary fear and anxiety through health education and condition communication. Second, healthcare burden significantly affects patients' FoP. as the disease progresses, the increased cost of treatment significantly raises patients' psychological burden. To alleviate this pressure, the healthcare system and society should provide more economic support and protection policies to help patients reduce their financial burden, thus alleviating their psychological pressure. In addition, the complexity of treatment modalities also elevates patients' FoP. the parallel use of multiple treatments may make patients feel their condition is more serious. Therefore, healthcare professionals should simplify treatment options as much as possible to improve the convenience of treatment and patient compliance, and to reduce the psychological burden caused by complex treatments. The source of health information also has a significant effect on FoP. Health information from medical personnel significantly reduced patients' FoP scores, indicating the importance of transparent and reliable information transfer in reducing patients' fear. Healthcare professionals should ensure that patients receive adequate, easy-to-understand disease-related information to reduce fear and uncertainty. Social support is also an important factor in alleviating FoP. Higher social support was associated with lower FoP scores, suggesting that the support of family, friends, and fellow patient groups is critical in managing the patient's psychological state. Encouraging patients to establish and maintain a good social support network may be effective in reducing their fear of disease progression.

In summary, this study emphasizes the importance of a comprehensive intervention strategy that includes improving disease perception, reducing healthcare burden, simplifying treatments, and enhancing health education and social support in order to comprehensively reduce the fear of disease progression in patients with type 2 diabetes mellitus. This approach not only improves patients' compliance behavior and quality of life, but also provides support at the psychological and emotional levels, ultimately promoting better health outcomes. Therefore, clinical staff should pay attention to these influencing factors in their daily work and help patients better manage their disease and improve their overall quality of life through multifaceted and comprehensive interventions.

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