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Psychological status and diabetes-related distress of Chinese type 1 diabetes patients in Jiangsu province, China

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Abstract

We sought to assess the psychological status and diabetes-related distress of Chinese type 1 diabetes patients in Jiangsu province, China. According to the World Health Organization criteria, 42 patients with type 1 diabetes were enrolled in the study and assessed with the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS) and Diabetes Distress Scale (DDS). All data were tabulated and statistical analyses were performed. The study summarized cases of 42 patients with type 1 diabetes, including 17 males and 25 females with a mean age of 23 ± 12 years and a mean duration of diabetes of 7 ± 6 years. Compared to the Chinese normative data, the SAS standard score was significantly higher, whereas SDS standard score had no statistical significance. The SAS standard score was most highly correlated with diabetes duration ($\gamma = 0.547$, $P = 0.011$). Additionally, 19.5% of the patients had moderate or even severe diabetes-related distress and 21.4% had moderate or even severe emo‒tional burden while 26.2% had regimen-related distress. Multiple stepwise regression analysis showed that the mean correlation between DDS and the four domains was high, particularly the emotional burden domain (esti‒mated $\beta = 0.363$, $P < 0.001$) and regimen-related distress domain (estimated $\beta = 0.356$, $P < 0.001$). The correlation between SAS and DDS was positive (estimated $\beta = 0.039$, $P = 0.027$). In conclusion, the results showed the im‒portance of psychological aspects in Chinese individuals with type 1 diabetes. Screening and treatment of psycho‒logical aspects may result in better adherence and increased quality of life for patients with diabetes.

Keywords: type 1 diabetes, anxiety, depression, diabetes-related distress

INTRODUCTION

The prevalence of type 1 diabetes has been in‒creased according to the World Health Organization (WHO) global database on diabetes and international studies. The observed trends have also appeared in China. Type 1 diabetes is a chronic illness requiring complex daily management, including adherence to an

insulin regimen (injections or an insulin pump), blood glucose monitoring and careful attention to nutrient intake and physical activity. Patients with type 1 diabetes often suffer from psychological disturbances[1-4]. Type 1 diabetes is a risk factor for psychiatric disorders, especially for internalizing behavior problems, including anxiety, depression and diabetes-related distress[5-7]. To a certain extent, type 1 diabetes may affect the patients´ social or family life. All individuals with diabetes and their families should be regularly screened for symptoms of psychological and social distress. To date, most studies have been conducted in individuals with type 2 diabetes, with little research in those with type 1 diabetes. A multi-centre observational study organized by the International Diabetes Federation, the Chinese Medical Association and Novo Nordisk. enrolled 2702 Chinese patients with type 2 diabetes. The survey showed that 28.5%-50.6% of the patients experienced various diabetes-related emotional problems[8]. However, the psychological outcome of type 1 diabetes in China remains unclear.

The aim of the current study was to survey the psychological status and diabetes-related distress in Chinese type 1 diabetic patients. Furthermore, we sought to identify the factors that may be correlated with diabetes status.

SUBJECTS AND METHODS

Subjects

All patients (n = 42) with type 1 diabetes included in this study came from Jiangsu Province, China. They were recruited to attend diabetic summer camp organized by the Department of Endocrinology, the First Affiliated Hospital of Nanjing Medical University in August, 2011. All patients met the WHO (1999) diagnostic criteria of type 1 diabetes[9] and had no family history of diabetes or overt autoimmune diseases and any other chronic diseases. All of the participants signed informed consent and completed the questionnaires confidentially. Each interview took approximately 30 minutes and the response rate was 100%. Data of the questionnaire included age, sex, diabetes duration, treatment regimen, body mass index (BMI) and level of education. Blood samples were taken to analyze glycosylated hemoglobin A1c (HbA1c), fasting blood glucose (FBG), postprandial blood glucose (PBG), triglyceride (TG), low density lipoprotein (LDL) and high density lipoprotein (HDL).

Measures

The Self-Rating Depression Scale (SDS) was designed by Zung in 1965. It is used to quantify the level of depression of patients experiencing depression-related symptoms. The assessment time span is one week. The test has 20 items, each is scored on a scale of 1-4 (never or occasionally, sometimes, often and most of the time), and the final score ranges from 20 to 80. Scores up to 40 are considered normal. The Chinese version has been validated[10]. The Self-Rating Anxiety Scale (SAS), which was also designed by Zung, is similar to SDS from scale structure to assessment methods[11]. The scale is a simple clinical tool for analysis of subjective symptoms of patients. The test also has 20 items[12], each is scored on a scale of 1-4 (never or occasionally, sometimes, often and most of the time), and the final score ranges from 20 to 80. Scores up to 41 are considered normal.

The Diabetes Distress Scale (DDS), which was developed by Polonsky[13,14], is a new instrument for the assessment of diabetes-related emotional distress. DDS has 17 items and four subscales: emotional burden (EB, 5 items), physician-related distress (PD, 4 items), regimen-related distress (RD, 5 items) and diabetes-related interpersonal distress (ID, 3 items). The Chinese version of DDS has a good reliability and validity (Cronbach´s = α 0.842-0.951). The responses are on a Likert scale from 1-6 points and an average score ⩾ 3 points is considered moderate distress. Clinical concerns are needed. If the average score < 3 points but the single issue score ⩾ 3 points, the issue needs investigation and intervention. The SDS and SAS are available in Chinese, have good psychometric properties and have been previously validated in populations with and without diabetes. DDS has been used among people with diabetes. We met with experts in the field and pilot tested relevant patients to confirm that the questionnaires were clear and understandable for clinical use.

Statistical analysis

All data were analyzed by using the SPSS18.0 program (SPSS Inc., Chicago, IL, USA). Firstly, descriptive analyses of the subjects were carried out and data were expressed as mean ± standard deviation (SD) and prevalence values. Potential differences in descriptive characteristics were analyzed using chi-square or t-tests. Multiple stepwise regression analysis was used to explore the association of the DDS scale with emotional burden, physician-related distress, regimen-related distress, and diabetes-related interpersonal distress. Pearson correlation coefficients were computed between duration, the DDS scale, the SAS and the SDS scales. Analysis of variances (ANOVA) was utilized where the effects of therapies as covariate were examined. Statistical significance was set up at $P < 0.05$.

***Table 1* General and clinical characteristics of type 1 diabetes patients**

Variable	N = 42
Gender	
Male	17 (40.4%)
Female	25 (59.5%)
Age, years	23.76±12.50
Onset	16.12±11.60
Duration	7.64±6.03
Body mass index (kg/m^2)	
Mean±SD	20.73±2.51
FBG (mmol/L)	
Mean±SD	7.57±5.22
PBG (mmol/L)	
Mean±SD	8.89±2.73
HbAlC (%)	
Mean±SD	7.30±5.22
TG (mmol/L)	
Mean±SD	1.09±0.71
LDL-C (mmol/L)	
Mean±SD	2.06±0.93
HDL-C (mmol/L)	
Mean±SD	1.31±0.37
Treatment [n(%)]	
Injections	32 (76.2%)
Pump	10 (23.8%)
Education level [n(%)]	
Primary school	6 (14.3%)
Junior high school	6 (14.3%)
Senior high school	14 (33.3%)
University	16 (38.1%)

FBG: fasting blood glucose; PBG: postprandial blood glucose; LDL-C: low-density lipoprotein cholesterol; HDL-C: high-density lipoprotein cholesterol; TG: triglycerides.

RESULTS

Baseline characteristics of the study partici–pants

The study summarized 42 patients with type 1 dia–betes, including 17 males and 25 females. Their mean age, age at diabetes onset and duration of diabetes were 23.76±12.5, 16.12±11.60 and 7.64±6.03 years, re–spectively. Their mean BMI was 20.73±2.51 kg/m^2 and the mean baseline HbA1c level was 7.30±5.22%. The mean fasting plasma glucose was 7.57±5.22 mmol/L and the mean postprandial blood glucose was 8.89±2.73 mmol/L. In addition, 76.2% of the patients

were treated with conventional insulin injections and 23.8% of the patients were using insulin pump (***Table 1***).

Psychological outcomes

Of 42 eligible patients, one of them did not return the SAS survey and 41 returned complete SAS surveys (97% of the sample), but all the participants completed the SDS and DDS surveys. Compared to the Chinese normative data, the SAS total score was significantly higher than the normative data, whereas the SDS to–tal score had no statistical significance ***(Table 2)***. The SAS total score was most highly correlated with diabetes duration (γ = 0.547, P = 0.011), whereas the SDS and DDS scores had no significant correlation with diabetes duration. Anxiety was more common in type 1 diabetes patients than in the general population, and was most highly correlated with diabetes duration. However, there was no statistically significant differ–ence in the incidence of depression in diabetes patients comapred with the general population.

DDS

The mean DDS score was 2.22±0.96, and 19.5% patients had moderate or even severe diabetes-related distress. However, there was no significant differ–ence between male and female (χ^2 = 0.036, P > 0.05). The results showed that 21.4% (n = 9) of the samples had moderate or even severe emotional burden, but regimen-related distress accounted for 26.2% (n = 11). Multiple stepwise regression analysis showed that the mean correlation between DDS and the four domains was high, particularly emotional burden (estimated β = 0.363, P < 0.001) and regimen-related distress (estimated β = 0.356, P < 0.001) ***(Table 3)***. The correlation between SAS and DDS was positive (estimated β = 0.039, P = 0.027). The main diabetes-related distress was apparently expressed in emotional burden and regimen-related distress, and showed pos–itive correlation with anxiety.

Analysis of therapies

From all of the 42 patients, 32 of them received conventional insulin injections for treatment, while 10 of them used insulin pump. The two groups had no significant difference in SAS/SDS total score and DDS domain score ***(Table 4)***. Psychological status and diabetes-related distress showed no statistical sig–

***Table 2* Comparison of the Chinese normative data by the SAS and SDS scores**

Items	n	Standard score	Chinese normative data	P value
SAS	41	39.5±8.57	29.87±0.46	0.000
SDS	42	42.6±10.0	41.85±10.57	0.619

SAS: self-rating anxiety scale; SDS: self-rating depression scale.

Table 3 Multiple stepwise regression analysis of the DDS scale results

Items	Estimated β	t value	P value
Emotional burden	0.363	45.628	< 0.001
Physician-related distress	0.288	28.208	< 0.001
Regimen distress	0.356	42.863	< 0.001
Interpersonaldistress	0.116	15.121	< 0.001

DDS: Diabetes Distress Scale.

nificance between conventional injections and insulin pump treatments.

DISCUSSION

The study gave us the opportunity to focus on psy–chological factors associated with diabetes. These psychological aspects were extensively measured by the generic and specific instruments. The availability of standardized instruments across languages, coun–tries and cultures enhances the prospect of comparing results from multinational and cross-cultural research. The SAS and SDS are universal scales. They can also be used to analyze the psychological status of the general population. The DDS has a more robust factor structure. In contrast to previous measures, the DDS is more conceptually driven, drawing items from four pre-established domains of diabetes-related distress: emotional burden, physician-related distress, regimen-related distress, and interpersonal distress. This may be especially useful when the instrument is used for planning clinical interventions. The results from the current study suggested that the Chinese versions of SDS, SAS and DDS have satisfactory psychometric properties for mapping individual levels of diabetes-related emotional distress among people with diabetes for diagnostic or clinical use.

Type 1 diabetes accounts for around 5%-10% of the whole diabetes population, but mainly adoles–cents[15-17]. Coping throughout life with dietary restric–tions, various therapies, continuous blood glucose monitoring, higher than normal prevalence of hospital admissions, and above all, the fear of hypoglycemic episodes and chronic complications will definitely im–pact on patients´ mood. Adolescents with type 1 dia–betes who adhere to an insulin regimen (*via* injections or an insulin pump) are more likely to suffer from psychological and behavioral problems[18-22]. Psycho–logical status may compromise therapeutic effica–cy[23-25]. However, much attention has been paid to the treatment of diabetes. Stable psychosocial resources have been associated with better chronic glycemic control, while stress and regimen non-adherence have been associated with reduced glycemic control[26]. The study by Moussas et al. found that the median scores of three emotional distress indices (anxiety, depression and total distress) in children and adolescents with type 1 diabetes were significantly higher than those without diabetes in Kuwaiti[27]. The study also showed that children with poor glycemic control (HbA1c > 10.0%) had significantly higher distress than children with good glycemic control (HbAIc ⩽ 8.0%), and there was a positive correlation between anxiety, de–pression and HbA1c concentrations.

The prevalence of type 1 diabetes generally in–creases year by year in China. Proper assessment of the psychological status of patients with type 1 dia–betes and diabetes-related distress is of great signifi–cance. The proportion of diabetes patients with anxi–ety or depression differs across countries. Llody et al. studied cross-cultural comparisons of anxiety and depression in adults with type 1 diabetes[28] and found that UK subjects were significantly more likely to report moderate to severe levels of anxiety compared to US subjects (17% vs. 5%; *P* < 0.001). Similar pro–portions of UK and US subjects reported moderate to severe levels of depressive symptoms (9% vs. 7%). A study of Chinese adults with type 2 diabetes showed that 61.74% of the subjects had anxiety, and 34.78% had depression. Our current study showed that, in Chinese patients with type 1 diabetes, anxiety appears more common than that in the general population.

Table 4 Psychological status of patients with conventional injections or insulin pump treatments

Items	Injections (*n* = 32)	Insulin pump (*n* = 10)	F vaule	P value
SAS	38.37±7.83	40.60±9.55	0.554	0.461
SDS	43.68±10.77	39.20±5.30	1.593	0.214
EB	2.23±1.24	1.78±0.74	1.206	0.279
PD	1.67±0.78	1.32±0.39	1.878	0.178
RD	2.37±1.20	1.68±0.59	3.067	0.088
ID	1.82±1.07	1.60±0.92	0.350	0.558

SAS: self-rating anxiety scale; SDS: self-rating depression scale; EB: emotional burden; PD:physician-related distress; RD: regimen-related distress: ID: diabetes-related interpersonal distress.

In the study, we also found that anxiety was most highly correlated with diabetes duration, highlight–ing the importance of studying the relationship of anxiety symptoms to self-care and adherence. But depression showed no statistically significant differ–ence in diabetes patients from the general population. It demonstrated that psychological disturbances were mainly reflected in anxiety. Repeated hospitalizations also make patients feel tired, thus anxious feelings becoming more apparent than depression or despair. We need to consider that in terms of psychological or pharmacological intervention. A study of 292 Nor–wegian adults with type 1 (80%) and type 2 (20%) diabetes aged 18-69 years suggested that younger patients had greater diabetes-related emotional dis–tress, with a negative correlation with age for DDS and for emotional burden and regimen-related dis–tress, and no significant association was found among diabetes duration, treatment regimen or type of diabetes[13]. In our study, the main diabetes-related distress apparently expresses in emotional burden and regimen-related distress, and has positive cor–relation with anxiety. Emotional burden is reflected in such as "feeling that diabetes is taking too much of my mental and physical energy every day", or "feel–ing that diabetes controls my life". It indicated that when undergoing diabetes health education, more attention should be paid to the participation of fam–ily members, pain caused by insulin injection, and complications[29-31]. Regimen-related distress is man–ifested in such as "feeling that I am not testing my blood sugars frequently enough", "feeling that I am not sticking closely enough to a good meal plan". So patients with poor glycemic control should be urged to adhere to glucose monitoring, and strengthen the knowledge of nutrition[32, 33].

In the past, the incidence rate of type 1 diabetes in China was lower. There is lack of knowledge about the psychological health of Chinese patients with type 1 diabetes. To our knowledge, the findings in the cur–rent study are unique as they shed light on the use of instruments in a sample of people with type 1 diabe–tes. The current data showed that the main psycho–logical problem of Chinese type 1 diabetes in Jiangsu is anxiety and highly correlates with diabetes duration.

The limitations of this study must be acknowledged. More research in larger populations and different set–tings is needed to establish the relative strength and weaknesses of the instrument and psychometric prop–erties in relation to sensitivity and responsiveness. In this study, the population is limited to patients in Jiangsu Province of China. These data provide a small sample of the physiological status of patients with type 1 diabetes in China. Type 1 diabetes patients have multiple psychological statuses due to cultural and economic differences in different regions. There is no nationwide type 1 diabetes psychological survey now in China. Early psychological intervention can prevent or alleviate various psychological problems, and pro–mote patients' physical and mental health.

References

[1] Polonsky WH, Fisher L, Earles J, Dudl RJ, Lees J, Mul–lan J, et al. Assessing psychosocial distress in diabetes: development of the diabetes distress scale. *Diabetes Care* 2005; 28: 626-31.

[2] Nardi L, Zucchini S, D´Alberton F, Salardi S, Maltoni G, Bisacchi N, et al. Quality of life, psychological adjust–ment and metabolic control in youths with type 1 diabe–tes: a study with self- and parent-report questionnaires. *Pediatr Diabetes* 2008; 9: 496-503.

[3] Hesketh KD, Wake MA, Cameron FJ. Health-related quality of life and metabolic control in children with type 1 diabetes: a prospective cohort study. *Diabetes Care* 2004; 27: 415-20.

[4] Varni JW, Burwinkle TM, Jacobs JR, Gottschalk M, Kaufman F, Jones KL. The PedsQL in type 1 and type 2 diabetes: reliability and validity of the Pediatric Quality of Life Inventory Generic Core Scales and type 1 Dia–betes Module. *Diabetes Care* 2003; 26: 631-7.

[5] Kovacs M, Goldston D, Obrosky DS, Bonar LK. Psy–chiatric disorders in youths with IDDM: rates and risk factors. *Diabetes Care* 1997; 20: 36-44.

[6] Lawrence JM, Standiford DA, Loots B, Klingensmith GJ, Williams DE, Ruggiero A, et al. Prevalence and cor–relates of depressed mood among youth with diabetes: the SEARCH for Diabetes in Youth study. *Pediatrics* 2006; 117: 1348-58.

[7] Lin EH, Katon W, Von Korff M, Rutter C, Simon GE, Oliver M, et al. Relationship of depression and diabetes self-care, medication adherence, and preventive care. *Diabetes Care* 2004; 27: 2154-60.

[8] Pan C, Yang W, Jia W, Weng J, Liu G, Luo B, et al. Psychological status of Chinese patients with Type 2 diabetes: data review of Diabcare-China studies. *Diabet Med* 2012; 29: 515-21.

[9] World Health Organization. Definition,diagnosis and classification of diabetes mellitus and its complications: Report of a WHO Consultation. Part 1.Diagnosis and classification of diabetes mellitus. Geneva,World Health Organization, 1999.

[10] Chan RC, Xu T, Huang J, Wang Y, Zhao Q, Shum DH, et al. Extending the utility of the Depression Anxiety Stress scale by examining its psychometric properties in Chinese settings. Psychiatry Res 2012; 200: 879-83.

[11] Zung WW. A rating instrument for anxiety disorders. *Psychosomatics* 1971; 12: 371-9.

[12] Forlani G, Nuccitelli C, Caselli C, Moscatiello S, Maz–zotti A, Centis E, et al. A psychological support program

for individuals with type 1 diabetes. *Acta Diabetol* 2011.

[13] Graue M, Haugstvedt A, Wentzel-Larsen T, Iversen MM, Karlsen B, Rokne B. Diabetes-related emotional distress in adults: reliability and validity of the Norwe–gian versions of the Problem Areas in Diabetes Scale (PAID) and the Diabetes Distress Scale (DDS). *Int J Nurs Stud* 2012; 49:174-82.

[14] Polonsky WH, Anderson BJ, Lohrer PA, Welch G, Jacobson AM, Aponte JE, et al. Assessment of diabetes-related distress. *Diabetes Care* 1995; 18: 754-60.

[15] Kovacs M, Obrosky DS, Goldston D, Drash A. Major depressive disorder in youths with IDDM. A controlled prospective study of course and outcome. *Diabetes Care* 1997; 20: 45-51.

[16] Blanz BJ, Rensch-Riemann BS, Fritz-Sigmund DI, Schmidt MH. IDDM is a risk factor for adolescent psy–chiatric disorders. *Diabetes Care* 1993; 16:1579-87.

[17] Northam EA, Matthews LK, Anderson PJ, Cameron FJ, Werther GA. Psychiatric morbidity and health outcome in Type 1 diabetes--perspectives from a prospective longitudinal study. *Diabet Med* 2005; 22:152-7.

[18] McDonnell CM, Northam EA, Donath SM, Werther GA, Cameron FJ. Hyperglycemia and externalizing behavior in children with type 1 diabetes. *Diabetes Care* 2007; 30: 2211-5.

[19] Duke DC, Geffken GR, Lewin AB, Williams LB, Storch EA, Silverstein JH. Glycemic control in youth with type 1 diabetes: family predictors and mediators. *J Pediatr Psychol* 2008; 33: 719-27.

[20] Cohen DM, Lumley MA, Naar-King S, Partridge T, Cakan N. Child behavior problems and family function–ing as predictors of adherence and glycemic control in economically disadvantaged children with type 1 dia–betes: a prospective study. *J Pediatr Psychol* 2004; 29: 171-84.

[21] Forlani G, Zannoni C, Tarrini G, Melchionda N, Marchesini G. An empowerment-based educational program improves psychological well-being and health-related quality of life in Type 1 diabetes. *J Endocrinol Invest* 2006; 29: 405-12.

[22] Simson U, Nawarotzky U, Porck W, Friese G, Schotten–feld-Naor Y, Hahn S, et al. Depression, anxiety, quality of life and type D pattern among inpatients suffering from diabetic foot syndrome. *Psychother Psychosom Med Psychol* 2008; 58: 44-50.

[23] Holmes CS, Chen R, Streisand R, Marschall DE, Souter S, Swift EE, et al. Predictors of youth diabetes care behaviors and metabolic control: a structural equation modeling approach. *J Pediatr Psychol* 2006; 31:770-84.

[24] Anderson JA, Wright ER, Kooreman HE, Mohr WK, Russell LA. The Dawn Project: a model for responding to the needs of children with emotional and behavioral challenges and their families. *Community Ment Health J* 2003; 39: 63-74.

[25] Shaban C, Fosbury JA, Cavan DA, Kerr D, Skinner TC. The relationship between generic and diabetes specific psychological factors and glycaemic control in adults with type 1 diabetes. *Diabetes Res Clin Pract* 2009; 85: 26-9.

[26] Peyrot M, McMurry JJ, Kruger DF. A biopsychosocial model of glycemic control in diabetes: stress, coping and regimen adherence. *J Health Soc Behav* 1999; 40:141-58.

[27] Moussa MA, Alsaeid M, Abdella N, Refai TM, Al-Sheikh N, Gomez JE. Social and psychological charac–teristics of Kuwaiti children and adolescents with type 1 diabetes. *Soc Sci Med* 2005; 60:1835-44.

[28] Lloyd CE, Zgibor J, Wilson RR, Barnett AH, Dyer PH, Orchard TJ. Cross-cultural comparisons of anxiety and depression in adults with type 1 diabetes. *Diabetes Me–tab Res Rev 2003*; 19: 401-7.

[29] Wild D, von Maltzahn R, Brohan E, Christensen T, Clauson P, Gonder-Frederick L. A critical review of the literature on fear of hypoglycemia in diabetes: Implica–tions for diabetes management and patient education. *Patient Educ Couns* 2007; 68: 10-5.

[30] Zhang X, Norris SL, Chowdhury FM, Gregg EW, Zhang P. The effects of interventions on health-related quality of life among persons with diabetes: a systematic review. *Med Care* 2007; 45: 820-34.

[31] Amsberg S, Anderbro T, Wredling R, Lisspers J, Lins PE, Adamson U, et al. A cognitive behavior therapy-based intervention among poorly controlled adult type 1 diabetes patients--a randomized controlled trial. *Patient Educ Couns* 2009; 77: 72-80.

[32] Trief PM, Ploutz-Snyder R, Britton KD, Weinstock RS. The relationship between marital quality and adherence to the diabetes care regimen. *Ann Behav Med* 2004; 27: 148-54.

[33] Trief PM, Wade MJ, Britton KD, Weinstock RS. A pro–spective analysis of marital relationship factors and qual–ity of life in diabetes. *Diabetes Care* 2002; 25: 1154-8.