Psycho-behavioral changes in children with type 1 diabetes mellitus

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Background: **Type 1 diabetes mellitus (T1DM) is the most common type of diabetes in children. This study aimed to investigate psycho-behavioral changes in Chinese children with T1DM and to provide some advices for nurses, parents and other persons.**

Methods: **Forty-five patients with T1DM (26 boys and 19 girls with a mean age of 10.40±3.01 years) were enrolled. According to the glycosylated hemoglobin levels recommended by the American Diabetes Association, the patients were subdivided into a well-controlled group and a poorly-controlled group. Fifty-three healthy children served as a control group. Psycho-behavioral changes were investigated by using Achenbach's Child Behavior Check List.**

Results: **Compared with the control group, the patients with T1DM had significantly higher mean scores for withdrawal, anxiety/depression, attention problems, delinquent behavior, aggressive behavior, externalizing problems, and internalizing problems (P<0.017). Moreover, the mean scores for somatic complaints in the poorly-controlled subgroup were significantly higher than those in the well-controlled subgroup (t=3.582, P=0.001). Compared with the control group, the well-controlled subgroup had higher scores for withdrawal, anxiety/depression, and internalizing problems (P<0.017). But the poorly-controlled subgroup had higher scores for withdrawal, somatic complaint, anxiety/depression, delinquent behavior, aggressive behavior, externalizing and internalizing problems (P<0.017).**

Conclusions: **Children with T1DM may have some psycho-behavioral problems. Timely nursing interventions must be conducted to solve these problems.**

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Original article

Introduction

Type 1 diabetes mellitus (T1DM) is the most common type of diabetes in children. It is characterized by an acute onset with prominent symptoms, requires a lifelong therapy with diet and insulin, and causes a series of complications. Moreover, numerous studies have shown that diabetic adults often present a variety of psychosocial problems. These problems include externalizing psychiatric symptoms, such as hyperactivity, aggressiveness, unpredictable behavior, internalizing symptoms, anxiety/depressive mood, solitary tendencies, and social withdrawal.[1,2] Several studies[3-5] on pediatric patients have also shown an association between diabetes and internalizing problems, depressive mood, and cognitive disorders. Lerner et al[6] reported that these problems in childhood could affect their growth, development and socialization process, and at last lead to maladjustment, criminal behaviors, and mental disorders during adulthood. Effective psychological care not only can control blood glucose and reduce acute or chronic complications, but also can improve emotional reactions that are conducive to the development of healthy personality. Psycho-behavioral problems are not only associated with health, but also with social culture, health education and family factors.[7,8] There are studies on the psychosocial behavior of diabetic children in other countries, but such studies are rare in China.

This study aimed to investigate the psycho-behavioral changes of children with T1DM using the Achenbach's Child Behavior Check List (CBCL) and explore the factors associated with psycho-behavioral status.

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Methods

Subjects

Fourty-five children with T1DM who had been treated at our hospital from 2003 to 2008 were enrolled in this study. They were diagnosed according to the criteria of the World Health Organization. Patients aged less than 6 years with other illnesses (hypothyroidism, hyperthyroidism, nephrosis, congenital heart disease, and extremity disability) and family histories of psychosis were excluded. The 45 patients were Han ethnics from Zhejiang Province. They comprised 26 boys and 19 girls, with a mean age of 10.40±3.01 years (range: 6 to 15 years). Among them, 2 were newly diagnosed and 43 had the disease for 3 months to 6 years. All of the patients were treated with insulin two to four times daily. Fifty-three healthy children (29 girls and 24 boys; mean age: 11.11±2.96 years, range: 6 to 15 years) served as a control group. Age and gender were not significantly different in the patients of the control group (P>0.05).

Informed consent was obtained from the parents of the patients and the approval of the study was also obtained from the Ethics Committee of the hospital.

Questionnaire investigation

The Achenbach's CBCL (a Chinese version) was completed by the parents (31 filled in by mothers and 14 by fathers). Emotional and behavioral changes of the patients were assessed according to the CBCL.[8] The investigators of this study included endocrinologists, nurses, and psychologists. Age, gender, educational status and parents' occupation were recorded. A total of 113 items were listed in the CBCL. The parents used a 3-point scale (0=not true, 1=somewhat or sometimes true, 2=very true or often true) to record the value of each item for their children.

The first part of the questionnaire addresses the psychosocial competence of children (activity, social competence, and school), and the second part addresses the behavioral and emotional problems and physical complaints (withdrawal, somatic complaints, anxiety/depression, delinquent behavior, aggressive behavior, social problems, schizoid/compulsive behavior, attention problems). Then, the scales of withdrawal, somatic complaints, and anxiety/depression were combined to form a superordinate scale and renamed as internalizing problems. The scales of delinquent behavior and aggressive behavior were combined to form a superordinate scale and renamed as externalizing problems. On all scales, raw scores, except T-scores, were reported.

Glycemic control

Blood samples were taken to analyze glycosylated hemoglobin (HbA1c) levels in the laboratory of our hospital. The reference range of normal HbA1c values was 3.9% to 6.1%. The optimal values of HbA1c were <8.0% for 10- to 12-year-old children and <7.5% for 13- to 18-year-old children according to the recommendations of the American Diabetes Association.[9]

Statistical analysis

Cronbach α was analyzed as an internal consistency for the CBCL scales. The Chi-square test was used to measure the enumeration data between the groups or subgroups. Quantitative data with normal distributions were expressed as mean±SD. Bonferonni's correction was used in multiple t tests, and a P<0.017 (0.05/3) was considered statistically significant.

Results

Cronbach's α coefficient for the total CBCL scales was 0.884. If the subscale was deleted, the values for withdrawal, somatic complaints, anxiety/depression, delinquent behavior, aggressive behavior, social problems, schizoid/compulsive behavior, and attention problems were 0.846, 0.864, 0.874, 0.865, 0.899, 0.883, 0.844 and 0.869, respectively. The CBCL scores of the control and patient groups are shown in Table 1. Compared with the control group, the patient group had significantly higher mean scores of withdrawal, anxiety/depression, attention problems, delinquent behavior, aggressive behavior, externalizing problems and internalizing problems in the CBCL (P<0.017). No other significant difference was noted between the two groups (P>0.05).

According to the levels of HbA1c, we divided the 43 patients into 2 subgroups. The well-controlled subgroup was composed of patients with HbA1c

Table 1. Comparison of the Child Behavior Check List profile between the control and patient groups

Variables	Control group	Patient group	t value	P value
Female/male	24/29	19/26	0.893	0.345
Age (y)	11.11±2.96	10.40±3.00	0.472	0.638
Withdrawal	1.42±0.91	2.16±1.35	3.230	0.002
Somatic complaints	1.32±0.89	1.73±1.12	1.971	0.052
Anxiety/depression	1.45±0.85	2.18±1.21	3.474	0.001
Social problems	1.45±0.89	1.51±0.84	0.439	0.662
Schizoid/compulsive behavior	1.09±0.84	1.02±0.84	0.424	0.672
Attention problems	1.26±0.86	1.51±0.92	1.373	0.009
Delinquent behavior	1.40±0.88	1.93±1.12	2.657	0.009
Aggressive behavior	1.42±0.82	1.91±1.04	2.639	0.010
Externalizing problems	4.19±2.50	6.07±2.87	3.468	0.001
Internalizing problems	2.81±1.64	3.84±1.83	2.942	0.004

levels within optimal goals in the last 3 months (at least 2 measurements), whereas the others were enrolled in the poorly-controlled group. The well-controlled subgroup included 15 boys and 13 girls, with a mean age of 10.04±2.86 years. The poorly-controlled subgroup included 9 boys and 6 girls, with a mean age of 10.47±3.34 years. There were no significant differences in gender and age distributions between the 2 subgroups (P>0.05) (Table 2). We noticed that the mean scores of somatic complaints in the poorly-controlled subgroup were significantly higher than those in the well-controlled subgroup (t=3.582, P=0.001). No other significant differences were observed in the CBCL results between the two subgroups (P>0.017) (Table 2).

Compared with the control group, the well-controlled subgroup had higher scores for withdrawal, anxiety/depression, and internalizing problems (t=2.309, P=0.004; t=3.063, P=0.003; t=2.442, P=0.017, respectively), whereas the poorly-controlled subgroup had higher scores for withdrawal, somatic complaints, anxiety/depression, delinquent behaviors, aggressive behaviors, externalizing and internalizing problems (t=3.750, P<0.001; t=4.106, P<0.001; t=3.019, P=0.004; t=3.302, P=0.002; t=2.969, P=0.004; t=4.176, P<0.001; t=2.471, P=0.016, respectively) (Fig).

Table 2. Comparison of the Child Behavior Check List profile between the well- and poorly-controlled subgroups

Variables	Well-controlled subgroup	Poorly-controlled subgroup	t value	P value
Female/male	13/15	6/9	0.164	0.686
Age (y)	10.04±2.86	10.47±3.34	0.444	0.659
Withdrawal	2.00±1.36	2.53±1.36	1.226	0.227
Somatic complaints	1.32±0.86	2.53±1.34	3.582	0.001
Anxiety/depression	2.18±1.23	2.27±1.16	0.222	0.825
Social problems	1.36±0.83	1.80±0.86	1.651	0.106
Schizoid/compulsive behavior	0.82±0.86	1.33±0.72	1.956	0.057
Attention problems	1.39±0.83	1.73±1.10	1.142	0.260
Delinquent behavior	1.79±1.20	2.27±0.96	1.339	0.188
Aggressive behavior	1.67±0.82	2.07±1.15	1.205	0.235
Externalizing problems	5.50±2.78	7.33±2.85	2.056	0.046
Internalizing problems	3.86±2.16	3.93±1.16	0.127	0.900

Discussion

Studies have shown an association between diabetes and psycho-behavioral problems in children. However, no similar study has been reported in China. Epidemiological studies[9-12] from different countries including China have demonstrated that the CBCL is an economical, reliable and valid screening instrument for psychopathological development in childhood and adolescence. In the present study, we investigated the psychological and behavioral problems in pediatric diabetics by the Chinese vision of Achenbach's CBCL.

The results of this study showed that T1DM children were at a high-risk for behavioral problems. The incidence of externalizing problems, including delinquent and aggressive behaviors, was significantly higher in the patient group than in the control group; this finding is consistent with most studies in other countries. These problems may be associated with a strong frustration of the patients due to the following reasons: (1) their difference from other children, e.g., they have to receive insulin injections every day; (2) changes in their life because of long-term control of diet and insulin injections; (3) life restricted because patients' parents lack understanding of diabetes; and (4) changes of other factors including negative school performance[13] and the mockery of classmates. Moreover, we noted that the well-controlled subgroup had scores for somatic complaints (part of internalizing

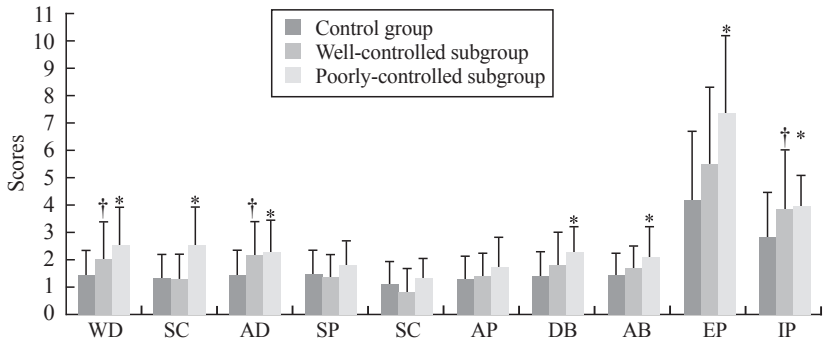

Fig. Comparison of the Child Behavior Check List profiles between the controls and the subgroups of patients using multiple t tests. *: significant difference between the poorly-controlled subgroup and the control group (P<0.017, respectively); †: significant difference between the well-controlled subgroup and the control group (P<0.017, respectively). WD: withdrawal; SC: somatic complaints; AD: anxiety/depression; SP: social problems; SC: schizoid/compulsive behavior; AP: attention problems; DB: delinquent behavior; AB: aggressive behavior; EP: externalizing problems; IP: internalizing problems.

problems), delinquent behaviors and aggressive behaviors, which were similar to those of the control group; whereas the poorly-controlled subgroup had higher scores for these profiles than the control group. This finding was similar to the reports that unstable blood glucose and other complications were related to psycho-behavioral changes.[14,15]

Psychologically, T1DM children are usually at a high risk. Thus, treatment combined with prevention and psychological care is necessary. Effective psychological intervention should include education of patients and their family members. The patients should be trained to deal with stress and other issues by themselves, and the families should support their children to control blood glucose.[16-18] A good family atmosphere is especially important because offensive behavior may produce grievous harm to the spirit of children. Nurses and parents should communicate with children and help them to engage in social activities. Positive attitude toward the disease is required so as to cultivate good behavior and positive emotion.[19] Early intervention combined with psychological care has been effective in controlling blood glucose.[15]

There are limitations in this study. First, the sample was too small to find additional differences between the two groups particularly when the patients were divided into the two subgroups. Second, since the age and gender of the patients in the two groups were comparable, we did not investigate other factors influencing child's psycho-behavior, e.g. with whom they live, education of guardian, family income, place to live (rural or urban areas, home or school). Third, other tools such as hospital anxiety and depression Scale or the Sluggish Cognitive Tempo Scale[1,20-22] were not used to support our findings in the present study using the CBCL. At last, no data were available on standard T-scores in children from Zhejiang Province, but raw scores not T-scores obtained directly from the CBCL were used in our study.

In short, children with T1DM have some psychosocial and behavioral problems. Timely interventions including education and nursing must be conducted to solve these problems.

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Contributors: Zheng XP had primary responsibility for patient screening and enrollment and data analysis. Chen SH supervised the design and performed the study.

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