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Original article

Alexithymia in adults with brittle type 1 diabetes

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Summary. *Background:* The term "brittle" is used to describe an uncommon subgroup of patients with type 1 diabetes whose lives are disrupted by severe glycaemic instability with repeated and prolonged hospitalization. Psychosocial problems and emotional disturbances are the major perceived underlying causes of brittle diabetes. Aim of this study is (a) to assess alexithymia in patients with brittle and non-brittle diabetes, and (2) to examine its relationship with specific parameters of general psychopathology. *Methods:* Participants comprised 44 patients with brittle diabetes and a case-control group of 88 individuals with stable (non-brittle) diabetes, matched for age, gender, years of education, and diabetes duration. Alexithymia and general psychopathology were assessed using the "20-item Toronto Alexithymia Scale" (TAS-20) and the "Symptom Checklist-90-Revised" (SCL-90-R). *Results:* Patients with brittle diabetes were more alexithymic than the control group. Alexithymia scores showed significant correlations with SCL-90-R anxiety and somatization subscales, but were relatively independent from gender, education, diabetes duration and complications, depression and glycaemic control. *Conclusions:* Given the impact of alexithymia on type 1 diabetes, the early detection and intervention of alexithymic subjects are very important for a better outcome of diabetes. (www.actabiomedica.it)

Key words: alexithymia, brittle diabetes, glycemic control, glycemic instability, psychopathology, type 1 diabetes

Background

Alexithymia is a multifaceted dimension encompassing a cluster of cognitive and affective characteristics relating to a difficultly in identifying and describing emotions in the self, an inability in differentiating them from bodily sensations, and an externally-oriented thinking style with poor fantasy and imagination (1, 2). A dichotomy was proposed to distinguish between primary and secondary alexithymia (3). Primary alexithymia is considered an "innate" and stable over time personality trait of neurobiological origin. It is though as a predisposing risk factor for the onset and/or maintenance of several psychiatric and medical disorders (such as anxiety, depression, somatoform disorders, hypertension, and functional gastrointestinal disorders) (4, 5). Secondary alexithymia is defined as a state reaction resulting from psychological stress, anxiety, depression, trauma, or even somatic illness during adolescence or adulthood (6).

Diabetes mellitus is also a stressful condition that generates negative emotional reactions, such as anxiety and depression (6). Indeed, in the face of a complex set of self-care directives (e.g. understanding the disease and its composite therapy, self-monitoring and self-adjustment of treatment), patients may become frustrated, angry, overwhelmed, and/or discouraged, while they have to cope with life-threatening risk of metabolic dyscontrol (7). Most studies investigating the relation between alexithymia and diabetes mellitus were conducted both in children/adolescents and in adult patients with type 1 diabetes and showed a high-

er prevalence of alexithymia in individuals with type 1 diabetes than in healthy controls, with values varying between 14.4% and 50% (6-12). Additional findings also showed an association between alexithymic features and worse glycaemic control (5, 8, 9, 12).

People affected by "brittle" type I diabetes are characterized by severe instability of glycaemic values with frequent and unpredictable fluctuations between hypoglycaemic and/or diabetic ketoacidosis episodes (13). Their quality of life is dramatically compromised because of very frequent acute complications (leading to hospital admissions) and premature chronic complications (14). Studies for hormonal and metabolic causes for brittle diabetes were not conclusive (15). More frequent "psychosocial" problems have been broadly demonstrated and are the major perceived underlying causes of brittle diabetes (16). Those have more often been described as non-specific anxious-depressive disorders, family dysfunction, marital disharmony, unsatisfactory relations with parents or spouse, bad-tempered separation or divorce, "life chaos", adolescent crises, unhappiness at school, and poor outside resources with no family support (17). Additional findings showed clinical features belonging to personality disorders, such as a history of manipulative behaviour, low frustration tolerance, difficulty in verbalizing emotions, obsessional glycaemic self-control, and poor impulse control (18). More recently, we observed that individuals with brittle diabetes showed no difference in terms of global severity of psychopathological distress and specific symptoms of axis I psychiatric diagnosis in comparison with subjects affected by "stable" (non-brittle) type 1 diabetes. Differently, they were more frequent affected by specific (cluster B) personality disorders (i.e. borderline, histrionic, and narcissistic type) (19, 20).

To the best of our knowledge, no study on alexithymia in brittle diabetes has been published in the literature to date. Aim of the current study was (1) to compare the presence and the levels of alexithymia in patients with brittle and non-brittle type 1 diabetes, and (2) to examine its relationships with glycaemic control and specific parameters of general psychopathology.

Methods

Subjects

All the participants (n=44) were patients affected by brittle type 1 diabetes recruited at the Diabetes Clinic of the Guastalla Civil Hospital (Reggio Emilia Public Health-Care Centre) between April 2009 to July 2010. They were all outpatients of at least 5-year duration of diabetes. Their age was comprised between 18 and 40 years. They were all native Italian-speakers. In order to avoid any attempt to selection, individuals with brittle diabetes had to fulfil the Tattersall's diagnostic criterion of "severe life-disrupting glycaemic instability of any kind" (21), as well as later accepted characteristics including "recurrent and/or prolonged hospitalization" (interfering with work and leisure) (22) and "glycaemic instability despite intensive subcutaneous insulin therapy (including subcutaneous pump treatment)" (23). To date, this is the most universally accepted working definition of "brittleness" (24). However, in all cases, infective, endocrine and therapeutic causes of glycaemic instability had been carefully excluded. Finally, according to the "Diagnostic and Statistical Manual of Mental Disorders, IV Edition, text revised" (DSM-IV-TR) criteria (25), all the participants had no previous history of major depression or any other axis I psychiatric disorder.

In order to create a case-control group, 88 individuals with "stable" (non-brittle) type 1 diabetes (i.e. patients who did not meet the universally accepted definition of brittle diabetes) were recruited at the same diabetic clinic. They were matched for age, gender, ethnic group, years of education, and diabetes duration. They were also all native Italian-speakers and had no previous history of any DSM-IV-TR axis I psychiatric disorder. Finally, both in groups with and without brittle diabetes, illiterate or markedly cognitively deteriorated patients and subjects suffering from mental retardation or organic mental disorders were excluded.

Full permission for the study was obtained from all participants, who specifically gave their written informed consent to the psychopathological assessment. Relevant ethical and local NHS research and development approvals were sought for the study. Finally, the

current study has been carried out in accordance with the Code of Ethics of the World Medical Assembly (Declaration of Helsinki) for experiments involving humans (Helsinki, 1964 and successive amendments).

Instruments and measures

A structured questionnaire was used to collect socio-demographic (i.e. age, gender, years of education, ethnic group, mother tongue, marital and employment status) and clinical data (i.e. diabetes duration, diabetes complications [retinopathy, nephropathy, macroangiopathy, microangiopathy, peripheral neuropathy, heart disease, and sexual dysfunction], personal psychiatric history, current use of psychotropic medications, and familiarity for diabetes and psychiatric disorders). To obtain a thorough evaluation, data were collected on the same day for each patient.

The "20-item Toronto-Alexithymia Scale" (*TAS-20*) (26) is the most widely used measure for the alexithymia construct. It is a self-report instrument that showed good psychometric properties (27) and consists of 20 items rating on a 5-point Likert scale (from1 to 5) along a "strongly disagree" to "strongly agree" continuum, with higher scores indicating more alexithymia. The total alexithymia score (ranging from 20 to 100) is the sum of all 20 item scores. The TAS-20 has conventionally a three-factor structure that assesses three different dimensions: (a) "Difficulty in Identifying Feelings" (DIF), (b) "Difficulty in Describing Feelings" to others (DDF), and (c) "Externally-Oriented Thinking" style (EOT). The first two factors match the emotional component of alexithymia, whereas the third one is linked to the cognitive component (26). Subjects with a TAS-20 total score of ≥ 61 were considered as "alexithymic" (26). In the present study, we used the Italian version of the TAS-20 (28).

The "Symptom Checklist-90-Revised" (*SCL-90-R*) (29) is a self-report questionnaire specifically designed to evaluate a broad range of psychopathological features. It is useful in a cross-sectional evaluation as a method for an overview of symptoms (and their intensity) at a specific point in time (i.e. in the last week) (30). It consists of 90 items (each one evaluated on a 5-point rating scale [from "0 = not at all" to "4 = extremely"]) and yields nine scores along primary symptom dimensions: "Somatization", "Obsessive-Compulsive" features, "Interpersonal Sensitivity" (corresponding to feelings of personal inadequateness and inferiority in comparison with others), "Depression", "Anxiety", "Hostility", "Phobic Anxiety" and agoraphobia, "Paranoid Ideation", and "Psychoticism" (corresponding to a continuous dimension of psychotic behavioural aspects from mild interpersonal alienation [such as withdrawal, isolation, and schizoid lifestyle] to dramatic evidence of first-rank schizophrenia symptoms [such as hallucinations or thought-broadcasting]). The SCL-90-R also generates three global indices of distress: "Global Severity Index" (GSI) (i.e. the average score of the 90 items of the questionnaire, designed to measure overall psychological distress); "Positive Symptom Distress Index" (PSDI) (i.e. the average score of the items scored above zero, designed to measure the intensity of symptoms); and "Positive Symptom Total" (PST) index (which corresponds to the number of items scored above zero). The GSI is suggested to be the best indicator of the current level of psychopathology (29). Good psychometric properties of the SCL-90-R have been widely demonstrated (30). In the current study, we used the Italian version of the SCL-90-R (31).

Glycaemic control was assessed according to HbA_{1c} levels. *HbA_{1c}* was measured by ion-exchange high performance liquid chromatography. The American Diabetes Association recommends an HbA_{1c} of ≤7% and careful reevaluation of treatment regiments for HbA_{1c} values consistently >8% (32). In the current study, we considered last HbA_{1c} measurement and the mean of the last three HbA_{1c} measurements.

Statistical analysis

Statistical analyses were performed using the "Statistical Package for Social Science" (SPSS), version 15.0. Descriptive data included mean value and standard deviation (SD) for quantitative variables, and absolute frequencies for categorical variables. Between-group comparisons on socio-demographic, clinical, and psychopathological parameters were performed using the Student's unpaired t-test for normally distributed quantitative variables. The Mann-Whitney's U test was used for quantitative variables

that were not normally distributed. Chi-squared (χ^2) test with Yates' correction or Fisher's exact test were employed for categorical variables. Fisher's exact test was used when any expected frequency was less than 1 or 20% of expected frequencies were less than or equal to 5. Spearman's rho (ρ) coefficients were performed to evaluate correlations of alexithymia with glycaemic control and psychopathological parameters.

Finally, hierarchical multivariable linear regression models were carried out to identify predictive socio-demographic, clinical, and psychopathological factors associated with TAS-20 scores. In details, socio-demographic variables (i.e. gender, age, years of education), clinical data (i.e. diabetes duration, glycaemic control [HbA_{1c} measurements], presence of diabetes complications, current use of psychotropic medications), and psychopathological parameters (i.e. SCL-90-R subscale scores) were entered as first, second and third block respectively. At each step, the increase of explained variance (ΔR^2) was computed. The rationale for the order of entry of the above-mentioned variables was that if some psychopathological factors still predicted alexithymia after the variance taken by more general socio-demographic and clinical variables, this will mean that these psychopathological features have made a unique contribution to the prediction of alexithymia. Statistical significance was set at a p-value ≤ 0.05.

Results

The *socio-demographic* and *clinical data* are shown in table 1. In comparison with patients with non-brittle diabetes, individuals with brittle diabetes showed significantly higher HbA1c levels and higher percentages of unemployed subjects and diabetes complications (in particular, retinopathy, nephropathy, and peripheral neuropathy). No differences were detected between the two groups in terms of gender, age, years of education, ethnic group, marital status, diabetes duration, current use of psychotropic medications, and familiarity for diabetes and/or psychiatric disorders.

Patients with brittle diabetes showed significantly higher *TAS-20* total score than individuals with non-brittle diabetes, as well as significantly higher scores in the DDF factor (table 1). In comparison with subjects affected by non-brittle diabetes, individuals with brittle diabetes were also more likely to be alexithymic (18.2% vs 2.3%) (table 1).

The comparison for *SCL-90-R* psychopathological parameters between individuals with brittle and non-brittle diabetes revealed no differences both in all primary symptom dimensions and in the three global distress indices (table 1).

With regard to clinical and psychopathological parameters, patients with brittle diabetes had significant positive correlations between TAS-20 and SCL-90 subscales scores (table 2). In detail, TAS-20 total score showed positive correlations with SCL-90-R "Somatization", "Anxiety", and "Phobic anxiety" subscale scores. Moreover, TAS-20 DIF factor score had significant positive correlations with all SCL-90 subscale scores. No significant correlations between SCL-90 subscale scores and TAS-20 DDF and EOT factor scores were detected. No significant correlation was also found between alexithymia and glycaemic control (table 2).

Hierarchical regression analysis results in brittle diabetes group are shown in table 3. No association between alexithymia scores and socio-demographic or clinical variables was found. The block of psychopathological parameters was the only one which made a significant contribution to the prediction of alexithymia. In particular, this effect was explained by SCL-90-R "Obsessive-Compulsive" subscale score (which had a significant positive association with TAS-20 total score [$F = 10.19$; adjusted $R^2 = 0.176$; $p = 0.003$] and EOT factor score [$F = 6.51$; adjusted $R^2 = 0.114$; $p = 0.014$]), and SCL-90-R "Somatization" subscale score (which had a significant positive association with DIF factor score [$F = 22.68$; adjusted $R^2 = 0.335$; $p = 0.001$).

Discussion

Socio-demographic and clinical data

In the present study, higher percentages of unemployed subjects were found in brittle diabetes group. This finding may involve both biological and psycho-

Table 1. Comparison of socio-demographic, clinical and psychopathological parameters, and alexithymia between patients with brittle and non-brittle diabetes.

Socio-demographic, clinical and psychopathological variables	Non-Brittle diabetes (n=88)	Brittle diabetes (n=44)	χ^2/t/z
Gender (♀)	56 (66.6%)	28 (66.6%)	.000
Age	32.91±4.80	32.07±3.21	.966
Ethnic group (Caucasian)	88 (100%)	44 (100%)	.000
Education (years)	12.59±2.62	12.82±3.38	-.353
Marital status (married)	52 (59.1%)	20 (45.5%)	1.139
Employment status (unemployed)	8 (9.1%)	14 (31.8%)	5.657[a]
Diabetes duration (years)	10.55±6.74	12.59±5.48	-1.562
HbA_{1c} (last measurement)	7.29±0.99	8.60±1.29	-5.387[c]
Mean HbA_{1c} (last three measurements)	7.15±1.28	8.35±1.20	-5.005[c]
Presence of diabetes complications	12 (13.6%)	26 (59.1%)	17.728[c]
Retinopathy	8 (9.1%)	16 (36.4%)	7.829[b]
Nephropathy	4 (4.5%)	12 (27.3%)	6.880[b]
Neuropathy	8 (9.1%)	14 (31.8%)	5.667[a]
Familiarity for diabetes	8 (9.1%)	8 (18.2%)	2.32
Familiarity for mental disorder	16 (18.2%)	14 (31.8%)	1.515
Current use of psychotropic medications	12 (13.6%)	8 (18.2%)	.085
Presence of *alexithymia*	2 (2.3%)	8 (18.2%)	5.993[a]
TAS-20 total score	39.00±13.89	55.05±12.83	-4.746[c]
TAS-20 "Difficulty identifying feelings" (DIF)	12.86±4.75	14.05±6.80	-.452
TAS-20 "Difficulty describing feelings" (DDF)	11.36±4.32	22.50±3.98	-7.766[c]
TAS-20 "Externally-oriented thinking" (EOT)	17.14±4.97	18.59±6.07	-1.110
SCL-90-R subscales			
Somatization	0.54±0.36	0.71±0.73	-.40
Obsessive-compulsive	0.47±0.26	0.56±0.39	-.29
Interpersonal sensitivity	0.39±0.33	0.42±0.35	-.25
Depression	0.48±0.44	0.56±0.28	-.24
Anxiety	0.46±0.42	0.47±0.37	-.17
Hostility	0.29±0.28	0.37±0.31	-.48
Phobic anxiety	0.65±0.38	0.89±0.73	-,43
Paranoid ideation	0.42±0.41	0.45±0.42	-.30
Psychoticism	0.15±0.11	0.18±0.12	-.20
Global severity index (GSI)	0.33±0.23	0.41±0.32	-.35
Positive symptom distress index (PSDI)	1.30±0.22	1.37±0.28	-1.45
Positive symptom total (PST) index	28.30±15.43	30.50±14.46	-1.60

Legend: [a]$p < 0.05$; [b]$p < 0.01$; [c]$p < 0.001$. Frequencies (percentages), mean ± standard deviation, chi-squared (χ^2) test, Student's t test, Fisher's exact test, and Mann-Whitney's U test (Z) values are reported

logical factors: i.e. (a) a biological factor associated with primary severe glycaemic instability, which could lead to repeated and prolonged hospitalization (because of more frequent episodes of unpredictable hypoglycaemia, diabetic ketoacidosis, and/or premature chronic complications [such as nephropathy, retinopathy, and neuropathy]), and (b) a psychological factor related to emotional disturbances observed in patients with brittle diabetes. Indeed, subjects affected by brittle diabetes with a history of low frustration tolerance, difficulty in verbalizing emotions (that is an alexithymic feature), and poor impulse control have been previously

Table 2. Spearman's correlations between alexithymia, glycaemic control and psychopathological parameters in patients with brittle diabetes (n=44)

Clinical and psychopathological variables	TAS-20 total score	TAS-20 DIF	TAS-20 DDF	TAS-20 EOT
HbA_{1c} (last measurement)	.041	.150	.034	-.020
Mean HbA_{1c} (last three measurements)	.097	.209	.013	.011
SCL-90-R subscales				
Somatization	.341[a]	.574[c]	.137	-.001
Obsessive-compulsive	.263	.371[a]	-.026	.231
Interpersonal sensitivity	.269	.515[c]	.176	-.037
Depression	.221	.403[b]	.221	-.090
Anxiety	.301[a]	.482[c]	.255	-.050
Hostility	.285	.488[c]	.191	-.025
Phobic anxiety	.302[a]	.419[b]	.161	.082
Paranoid ideation	.086	.415[b]	-.050	-.090
Psychoticism	.026	.346[a]	.005	-.181

Legend: [a]$p < 0.05$; [b]$p < 0.01$; [c]$p < 0.001$. Spearman's correlation ρ coefficient values are reported

Table 3. Hierarchical regression analysis predicting alexithymia by socio-demographic, clinical, and psychopathological variables in patients with brittle diabetes (n=44)

Model predictors	TAS-20 total score		TAS-20 DIF		TAS-20 DDF		TAS-20 EOT	
	β	t	β	t	β	t	β	t
Step 1								
Age	.08	.57	-.58	-.38	.09	.60	-.31	-2.20
Gender (male)	.27	1.92	.07	.47	.35	1.99	.35	2.22
Education (in years)	-.02	-.17	.09	.60	.13	.55	-.19	-.88
Step2								
Diabetes duration (in years)	.30	1.97	.33	1.99	.34	1.98	.04	.24
HbA_{1c} (last measurement)	.07	.48	.04	.25	.08	.61	.11	.73
HbA_{1c} (last three measurement)	.12	.86	.10	.69	.09	.63	.17	.82
Diabetes complications	-.31	-1.99	-.32	-1.98	-.01	-.15	-.14	-.78
Psychotropic medications	.06	.40	.10	.74	.12	.76	.14	.97
Step3								
Somatization	.23	.93	.59	4.76[a]	.19	.88	-.28	-1.10
Obsessive-compulsive	.44	3.19[b]	.02	.10	.03	.11	.46	3.20[a]
Interpersonal sensitivity	.11	.62	.22	1.21	.24	1.25	-.34	-1.87
Depression	.14	.77	.05	.21	.04	.20	-.29	-1.35
Anxiety	.10	.52	.04	.15	.03	.13	-.25	-1.23
Hostility	.09	.45	.03	.11	.04	.14	-.26	-1.22
Phobic anxiety	.09	.45	-.12	-.52	-.11	-.50	.-.15	-.67
Paranoid ideation	.05	.25	.02	.11	.06	.17	-.21	-1.13
Psychoticism	-.01	-.05	.01	.04	.02	.06	-.35	-1.84

Legend: [a]$p < 0.05$; [b]$p < 0.01$. β standardized coefficients and t values are reported

described (14, 16, 33, 34). Emotional disturbance of brittleness could interfere with work, inducing a bad self-management of the stress.

Consistently with other studies, our findings also showed significantly higher HbA_{1c} levels and percentages of diabetes complications (i.e. retinopathy,

nephropathy, and peripheral neuropathy) in patients with brittle diabetes. These results confirm that people affected by brittle type 1 diabetes suffer from a poor metabolic control characterized by severe instability of glycaemic values (13). Moreover, their quality of life is also more often compromised because of very frequent and premature chronic complications (14).

In the current study, no difference across the two groups in terms of current use of psychotropic medications, presence of past and/or current mental disorder, and familiarity for psychiatric disorder was detected. These findings confirm that only few patients with brittle diabetes result to have been seen by psychiatrists and/or psychologists (34, 35).

Psychopathological data

In the present study, between-group comparisons for SCL-90-R psychopathological parameters showed no significant difference in terms of intensity of all the primary specific symptom dimensions of psychopathology and global severity of psychopathological distress. This means that patients affected by brittle diabetes did not suffer more frequently or intensively from symptoms of major (axis I) psychiatric disorder compared to subjects with stable (non-brittle) diabetes. Our findings are not in line with those of previous studies, in which subjects with brittle diabetes showed to be more frequently affected by anorexia nervosa and unspecified anxious-depressive disorders (18, 34, 36).

Alexithymia

This is the first study exploring alexithymia in brittle type 1 diabetes. In our brittle subsample, alexithymic construct had a prevalence of 18.2%, a value significantly higher than in subjects with non-brittle diabetes. The association between alexithymia and brittle diabetes could be explained by (a) an overrepresentation of primary alexithymia (source of greater vulnerability to emotional stress that interferes in both the onset and the course of diabetes) (7) and/or (b) a higher level of secondary alexithymia. Indeed, the onset of brittle type 1 diabetes is often acute and symptomatic, requiring an immediate and mandatory treatment and change in life-style (34). Other factor that could be a source of secondary alexithymia include the impact of the onset of diabetes at a younger age (6), as well as the exposure to stressors such as hospitalization and serious complications leading to chronic stress, emerging psychiatric symptoms (e.g. anxiety, depression, somatoform features), and psychopathological distress (10).

Our findings also showed that patients with brittle diabetes had significantly higher TAS-20 total scores than individuals with non-brittle diabetes, as well as significantly higher scores in DDF factor. These findings seem to confirm that emotional disturbance of brittleness may include alexithymic features, especially a difficulty in verbalizing and describing feelings to others. Recently, we found that individuals with brittle diabetes were more frequently affected by DSM-IV-TR cluster B personality disorders (i.e. borderline, narcissistic, and histrionic type), which are specifically characterized by a deficit in emotional regulation and stress management (19, 20). Our findings make psychological assessment extremely necessary in brittle diabetes, especially in terms of personality traits. Our results also suggest that psychological intervention (i.e. psychotherapy) could be very useful to obtain a better glycaemic control. Therefore, everyone must be made aware that the treatment of brittle diabetes is likely to be prolonged and that the responsibility for successful outcomes does not lie with the diabetologist alone. Indeed, the patient, psychotherapist, and the family members must be prepared to cooperate (19). This alliance is a key-determinant for treatment adherence and appropriate metabolic control (7). Given the importance of therapeutic compliance in the course and the prognosis of brittle diabetes, an optimal psychological support becomes an absolutely necessary part of a multidisciplinary approach (37).

In the present study, we found no association between alexithymia and worse glycaemic control in brittle diabetes group. In the literature, results are not univocal. Most studies showed a positive correlation between alexithymia and the quality of glycaemic control. In this sense, Topsever et al. (12) observed that alexithymic patients with type 1 diabetes had a less balanced diabetes than their non-alexithymic peers. On the contrary, but consistent with our finding, Friedman et al. (10), Chatzi et al. (6), and Mnif et al.

(7) showed no relationhip between glycaemic control and alexithymia in subjects affected by type 1 diabetes.

In our research, individuals with brittle diabetes showed significant positive correlation between alexithymia (taken as a whole) and SCL-90-R subscales related to anxiety and somatization. This finding is in line with that reported in a sample of 50 patients with type 1 diabetes by Minf et al. (7), who observed a strong association between alexithymia and anxiety. Links between anxiety (and/or somatization) and alexithymia raise the question of the similarity of symptoms. Indeed, the inability to distinguish between feelings and bodily sensation in anxiety is also referred to as emotional component of the TAS-20. The existence of a conceptual overlap between alexithymia and anxiety (and/or somatization) does not help to explain whether alexithymia is a cause or a consequence of this symptomatology. Through hierarchical multivariable regression analysis, we found that SCL-90-R "Obsessive-Compulsive" and "Somatization" subscale scores were associated with alexithymia scores (particularly DIF and EOT factors) in patients with brittle diabetes. Therefore, the alexithymia observed in brittle diabetes could be in part considered as a secondary consequence of the distress associated with anxiety, reflecting a coping strategy to face a stressful situation. This type of alexithymia could decline over time once the triggering factors disappear (7). However, in subjects with chronic debilitating disease (such as brittle type 1 diabetes), secondary alexithymia may become permanent and cannot be distinguished from primary alexithymia (38).

In our study, the alexithymic difficulty in describing feelings (DDF), which specifically distinguished patients with brittle and non-brittle diabetes, showed no association with SCL-90-R psychopathological subscales. Therefore, it appears to be a primary and clinically independent component of alexithymia. On the contrary, the alexithymic difficulty in identifying feelings (DIF), which correlated with all SCL-90-R subscales (including depression), seems to be more dependent on severity of the psychopathology experienced by individuals with brittle diabetes. Links between some aspects of alexithymia and depression raise the same question of the similarity of symptoms. Indeed, affective flattening was found both in alexithymia and depression, making one a reflection of the other (7). However, perspective studies in patients with psychiatric or chronic medical illness showed that alexithymia observed during depression remained stable even following remission of depressive symptoms (2).

Conclusions

Our findings suggest that alexithymia in brittle diabetes may be a multicomponent dimension including both specific traits and state factors. Future studies should attempt to differentiate these components by assessing premorbid and developmental functioning.

We finally should mention some *limitations* of the current study. Firstly, the diagnostic criteria of brittleness are mainly based on a clinical observation of the diabetes course and thus could suffer from the arbitrary subjectivity of the clinician. According to us, it could be useful to draw up more objective criteria based on blood glucose parameters and their course over time (19, 20). Secondly, our sample of patients with brittle diabetes was numerically small (n=44). Therefore, further studies in a larger population are needed. Furthermore, in the present study, we only used self-report instruments to assess psychopathology (i.e. TAS-20 and SCL-90-R). These scales could suffer from an excessively subjective point of view. Therefore, further studies without self-report assessment tools are needed. Finally, the cross-sectional nature of our research hinders the real distinction between primary and secondary alexithymia, as well as the direction of the association between alexithymia and psychopathological parameters. Thus, further perspective studies are needed. Moreover, if causality is searched, some other mediator variables (such as distress or coping strategies) are necessary.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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