Different associations of depressive subtypes with glycemic control

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ABSTRACT

Associations of depression with glycemic control are not conclusive. While some studies found a positive association, others found none or found that diabetes distress is a mediating factor. These inconsistencies might be due to the complex symptomatology of depression. Depressive symptoms can range from sleep or appetite disorders to depressed mood and having crying spells. Thus, depressive symptoms can be divided into somatic and affective symptoms. This study investigated the associations of the different depressive subtypes with glycemic control. 923 patients completed the Center for Epidemiological Studies - Depression scale (CES-D) which offers subscales for somatic and affective symptoms. Linear regression analysis with HbA1c as dependent variable was conducted. Independent variables of interest were the somatic and affective scores of the CES-D controlled for demographic (age, gender, body mass index, education) and medical (diabetes type, diabetes duration, number of SMBG, late-complications) variables as well as diabetes distress. Both depressive subtypes were significantly associated with HbA1c. A greater somatic symptomatology was associated with a higher HbA1c (β = .15; p = .001) whereas a greater affective symptomatology was associated with a lower HbA1c (β = -.15; p = .001). Greater diabetes distress was associated with higher HbA1c (β = .13; p = .001). Linear regression with depressive symptoms in general (CES-D total score) as independent variable revealed no significant association (β = -.01; p = .86). This study demonstrated that depression is a complex condition and offers an explanation for the inconsistencies in current literature regarding associations with glycemic control. Only the differentiation of subtypes offered a more complete picture of the associations of depression with glycemic control. In clinical practice and further research, a closer look which symptoms of depression are present may be helpful to better understand depression as a vulnerability factor.

INTRODUCTION

Depression is a well-established vulnerability factor. People with diabetes and depression have a higher risk for micro- and macrovascular complications and early mortality, a reduced quality of life, and higher healthcare expenditures (compared to people with diabetes but without depression). Regarding glycemic control, associations with depression are not conclusive. While some studies found depression to be associated with worse glycemic control, others found no association or found that diabetes distress is a mediating factor. The complex symptomatology of depression may explain these inconsistencies. Depressive symptoms can range from sleep or appetite disorders to depressed mood and having crying spells. Thus, depressive symptoms can be divided into somatic and affective symptoms. This study analyzed whether these depressive subtypes are associated with glycemic control.

METHODS

986 people with type 1 or type 2 diabetes (table 1) completed the Center-for-Epidemiological-Studies Depression Scale (CES-D), as well as the Problem Areas in Diabetes questionnaire (PAID). In addition, demographic and medical variables were collected from these patients. A1c was analyzed in a central laboratory.

Depressive Symptoms:

- The CES-D consists of 20 items and allows the calculation of a somatic and affective sub-score from 7 items, respectively. Mean item scores were calculated for each subtype.
- Items are answered on a 4-point scale ranging from „0 – rarely or none of the time" to "3 – most or all of the time".
- A score of ≥ 16 is indicative of elevated depressive symptoms. This cut-off can be transformed to a mean item score of 0.8.

Regression analysis:

- A1c was used as dependent variable; independent variables of interest were the somatic and affective sub-scores (as continuous variable)
- The regression was adjusted for demographic (age, gender, BMI, education years) as well as medical variables (diabetes type, diabetes duration, late complications, blood glucose measurements per day).
- Diabetes-related distress was additionally entered into the model to account for possible mediating effects found in the literature.
- A second analysis was conducted with the CES-D total score (sum score of all 20 items) as independent variable – all other variables remained the same.

RESULTS

Depressive Symptoms:

- The somatic sub-score was significantly higher than the affective sub-score (0.70 ± 0.52 vs. 0.44 ± 0.51; p < .001; figure 1).
- 38% of patients had an elevated somatic sub-score (mean item score ≥ 0.8), whereas just 21% of patients had an elevated affective sub-score. The sole presence of elevated affective symptoms was rather rare with just 3% (table 2).

Regression analysis:

- A higher somatic sub-score was significantly associated with a higher A1c (β = .15; p = .001).
- A higher affective sub-score was significantly associated with a lower A1c (β = -.15; p = .001).
- Diabetes-related distress was furthermore associated with a higher A1c (β = .13; p = .001).
- By entering der CES-D total score as independent variable instead of the sub-scores, no significant association with A1c could be found (β = .01; p = .86; figure 3). The comparison of beta-weights in figure 3 shows that the depressive subtypes have diametrically opposed associations, compared to the lack of association of the total score.

CONCLUSION

The study demonstrated that depression or depressive symptoms are complex and can have distinct associations. The fact that no association of the CES-D total score was found seems to support the notion that the associations of both subtypes did neutralize each other when the total score was entered into the model. Only the separate inclusion of both subtypes revealed associations with glycemic control. These findings could explain the heterogeneity in the literature regarding the associations of depression with glycemic control. Further research is needed to fully understand and interpret the negative association of the affective subtype in this multivariate analysis. By understanding depression as a complex symptom-cluster rather than a uniform condition, a more complete understanding of this vulnerability factor is possible.

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Table 1: Sample Characteristics

N = 986	M ± SD / %
Age	50.4 ± 15.0 years
Gender	42% female
Education years	10.9 ± 3.0 years
Diabetes type	39% type 2 diabetes
Diabetes duration	14.8 ± 11.3 years
BMI	28.6 ± 6.0 kg/m²
HbA1c	8.2 ± 1.5%
Late complications (at least 1)	51%

Table 2: Prevalence of elevated somatic and affective symptoms

		Somatic symptoms: elevated	Somatic symptoms: not elevated	
Affective symptoms	elevated	177 18.0%	28 2.8%	205 20.8%
	not elevated	200 20.3%	581 58.9%	781 79.2%
		377 38.2%	609 61.8%	986

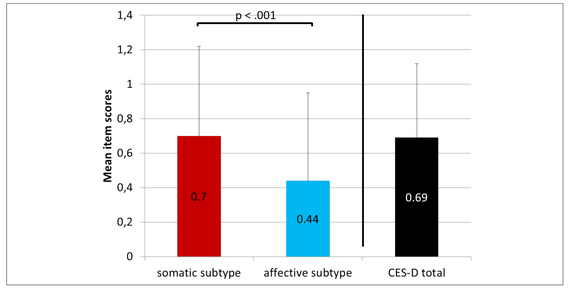

Figure 1: Comparison of the somatic and affective subtypes (paired t-test) and the CES-D total score

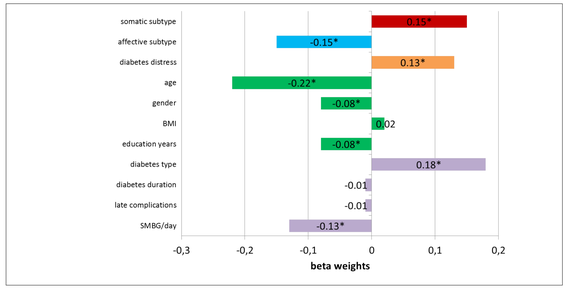

Figure 2: Standardized regression coefficients of the regression on A1c. * p < .05

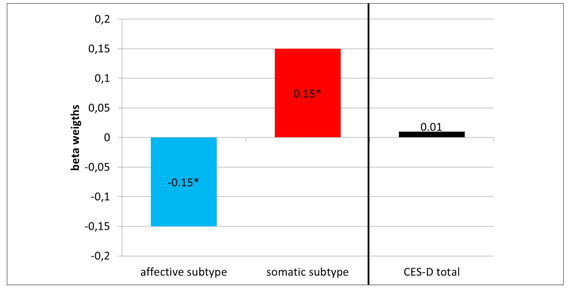

Figure 3: Regression on A1c – Comparison of regression coefficients of the regression with subtypes (left) and of the regression with the CES-D total (right). * p < .05