

Affective and anxiety disorders in a German sample of diabetic patients: prevalence, comorbidity and risk factors

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Abstract

Aims The aims of this study were to examine (1) the prevalence of clinical and subclinical anxiety and affective disorders in a sample of diabetic patients attending a secondary care clinic in Germany and (2) risk factors associated with the occurrence of these disorders.

Methods Four hundred and twenty diabetic patients (36.9% Type 1; 24.7% Type 2; 38.4% Type 2 with insulin) participated in a questionnaire-based screening survey. Those who screened positive received a diagnostic interview.

Results Prevalence of clinical affective disorders was 12.6%, with an additional 18.8% of patients reporting depressive symptoms without fulfilling all criteria for a clinical affective disorder. The prevalence of anxiety disorders was 5.9%, with an additional 19.3% of patients reporting some anxiety symptoms. The comorbidity rate of affective and anxiety disorders was 1.8%, whereas 21.4% of the diabetic patients reported elevated affective as well as anxiety symptomatology. Logistic regression established demographic variables such as age, female gender and living alone as well as diabetes-specific parameters such as insulin treatment in Type 2 diabetes, hypoglycaemia problems and poor glycaemic control as risk factors for affective disorders. For anxiety symptoms female gender, younger age and Type 2 diabetes were significant independent variables.

Conclusion The prevalence of affective disorders in diabetic patients was two-fold higher than in the non-diabetic population, whereas prevalence for anxiety disorders was not increased. Analysis of risk factors can facilitate the identification of patients who are at a greater risk for these disorders.

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Keywords affective disorder, anxiety disorder, prevalence, comorbidity, subclinical disorders

Abbreviations DSM, Diagnostic and Statistical Manual of Mental Disorders; ICD, International Classification of Diseases and Related Disorders; HPLC, high-pressure liquid chromatography; BDI, Beck depression inventory; CES-D, Center of Epidemiological Studies—Depression Scale; STAI, State Trait Anxiety Inventory; CIDI, Composite International Diagnostic Interview

Introduction

The prognosis of diabetes mellitus depends highly on efficient self-management on a daily basis. In common with other chronic diseases a comorbid psychiatric disorder can be a major barrier to the management of diabetes [1,2].

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Whereas there is good evidence of higher rates of affective disorders in diabetic patients [3–5], the prevalence of an anxiety disorder in diabetic patients remains more controversial [6,7]. The only review in the literature examining anxiety disorders and diabetes reported no elevated prevalence except for generalized anxiety disorder [6]. More research on the prevalence of anxiety disorders in diabetic patients would seem to be warranted.

Furthermore, affective disorders and comorbid anxiety are associated with greater symptom severity and persistence, more severe role impairment, and increased help-seeking behaviour than the occurrence of only one of these disorders [8,9]. Given the known high comorbidity of anxiety and affective disorders in non-diabetic persons [10,11], the comorbidity of these two psychiatric disorders in diabetic patients is an important question.

Most studies about diabetes and comorbid affective disorders and anxiety have been conducted in US-American samples [3,4]. For European countries the transcultural validity of the above-mentioned results in diabetic patients can be questioned, because of ethnic and socio-economic differences as well as different prevalence rates for these psychiatric disorders [12]. European studies reporting the prevalence of affective disorders and anxiety in diabetic patients are not up-to-date, as indicated by the mean publication year of 1993 [3,7,13].

The measured prevalence of affective and anxiety disorders is highly dependent on the assessment method. Self-report measures yield substantially higher prevalence rates for affective disorders and anxiety than the use of a structured diagnostic interview according to Diagnostic and Statistical Manual of Mental Disorders (DSM) or ICD (International Classification of Diseases and Related Disorders) [14,15]. The latter approach only includes clinical cases, meeting the required criteria, whereas questionnaire-based studies also include subclinical cases with an elevated anxiety or depressive symptomatology, but not meeting all criteria [3,6,16].

Clinical as well as subclinical affective and anxiety disorders have a negative impact on quality of life, glycaemic control, prognosis of diabetes and health-related costs in diabetic patients [5,17–21]. In non-diabetic populations there are established risk factors for affective and anxiety disorders such as female gender, higher age, living alone, and lower socio-economic status [22]. Beside these risk factors disease-specific variables such as type of diabetes, duration of disease, occurrence of late complications or severe hypoglycaemic episodes and poor glycaemic control might be specifically linked to these disorders [5,23]. Knowledge of disease-specific and non-specific risk factors can facilitate the early identification of persons at risk, which is important in the light of the available treatment for anxiety and affective disorders [24–26]. The differentiation between clinical and subclinical forms of anxiety and affective disorders should allow us to analyse whether different variables are associated with clinical and subclinical forms of these disorders.

The objectives of this study were: (1) to estimate the prevalence of clinical and subclinical anxiety and affective disorders

and the rate of comorbidity of these psychiatric disorders in a German sample of diabetic patients and (2) to assess which disease-specific and disease-non-specific factors are associated with clinical and subclinical affective and anxiety disorders.

Patients and methods

All diabetic patients referred to the Diabetes Centre Mergentheim in June and July 2002 for inpatient treatment aged between 18 and 75 years were invited to participate in our survey ($n = 529$). The main reasons for referral to the Diabetes Centre are the treatment of late complications and difficulty in achieving satisfactory glycaemic control. Of these individuals $n = 420$ signed written informed consent to participate in the study. Reasons for not participating were language problems ($n = 13$), visual problems ($n = 8$), cognitive deficits as indicated by difficulties in reading and understanding questionnaires ($n = 26$); acute illness requiring bed rest (18), discharge to another hospital ($n = 6$), refusal to participate ($n = 31$). Seven screening questionnaires were incomplete and were therefore excluded from analysis.

The participating 420 subjects completed a questionnaire relating to their demographic characteristics and problems with hypoglycaemia, including age, education, living situation and occurrence of severe hypoglycaemia in the past 12 months requiring assistance. Medical information including type of diabetes and late complications (retinopathy, nephropathy, neuropathy, coronary heart disease, apoplexy, peripheral vascular disease, diabetic foot problems) were obtained from a thorough medical interview and medical examination. Glycated haemoglobin (HbA_{1c}) was measured using the high-pressure liquid chromatography (HPLC) method (non-diabetic range 4.0–6.1%). For screening purposes the patients completed two questionnaires for depression symptoms and one for anxiety symptoms. Depression questionnaires were the German version of the Beck Depression Inventory (BDI) [27] and of the Centre of Epidemiological Studies—Depression Scale (CES-D) [28]. The German Trait version of the State Trait Anxiety Inventory (STAI) [29] was used to assess anxiety.

If participants yielded a score one standard deviation above the mean of the reference population in the BDI (cut-off score > 10) or CES-D (cut-off score > 23) or STAI (cut-off score > 44), they were invited to a diagnostic interview. It should be noted that the CES-D cut-off score of one standard deviation above the mean of the German reference population used (> 23) is different from the cut off score > 16 of the US version of the CES-D [30].

According to these criteria 163 subjects (38.8%) scored a positive screening result. The diagnostic interview was conducted in 131 subjects. Thirty-two patients with a positive screening result did not participate in the interview (eight patients were discharged before an interview could be scheduled, one patient developed an acute illness and 23 patients refused to participate). To determine whether non-participation biased the results potential differences between participants and non-participants were analysed. There were no significant differences between participants and non-participants in age, disease duration, gender, living alone, glycaemic control, the number of late complications or hypoglycaemia problems. Although those patients who did not participate in the diagnostic interview had slightly higher scores in the screening questionnaires, there

were no significant differences between subjects participating or not participating in the interview (BDI: 16.3 ± 10.5 vs. 16.8 ± 8.3 , $P = 0.78$; CES-D: 26.1 ± 10.4 vs. 27.9 ± 8.8 , $P = 0.39$; STAI: 49.7 ± 10.3 vs. 52.2 ± 8.3 , $P = 0.22$). Thus 388 diabetic patients were included in the final data analysis. Demographic and medical characteristics are described in Table 1.

The study was conducted according to the recommendation of the Declaration of Helsinki and was approved by the local ethics committee.

Table 1 Sample characteristics

Variable	<i>n</i> (%)
Sex	
Male	239 (61.6)
Female	149 (38.4)
Age (years)	
18–48	137 (35.3)
49–62	135 (34.8)
> 62	116 (29.9)
Living alone	
No	305 (79.6)
Yes	78 (20.4)
Education	
Less than high school	221 (57.0)
High school	104 (26.8)
College	63 (16.2)
Disease type	
Type 1	143 (36.9)
Type 2 without insulin	96 (24.7)
Type 2 with insulin	149 (38.4)
Disease duration (years)	
< 6	121 (31.2)
7–16	142 (36.6)
> 16	125 (32.1)
HbA _{1c}	
< 7.5	119 (30.7)
7.5–8.3	130 (33.5)
> 8.3	139 (35.8)
Complications	
Retinopathy	122 (31.4)
Nephropathy	24 (6.2)
Neuropathy	193 (49.6)
Coronary heart disease	54 (13.9)
Stroke	17 (4.4)
Peripheral vascular	55 (14.1)
Diabetic foot problems	36 (9.3)
Number	
0	140 (36.1)
1	109 (28.1)
> 1	139 (35.8)
Severe hypoglycaemia	
No	337 (86.9)
Yes	51 (13.1)

Data shown as *n* (%). (%) are column per cents [exception: type of late complication: (%) are prevalence in the whole sample]. Figures do not always add up to the total number because of missing data.

The diagnostic interview chosen was the Composite International Diagnostic Interview (CIDI) for ICD 10. The psychometric properties of the CIDI are well studied. In a validation study of CIDI the interrater reliability for anxiety disorders was Cohen's $\kappa = 0.96$ and for affective disorders $\kappa = 0.95$ [31]. The interviewer was a psychology graduate, who was trained before conducting the interviews and supervised during the data collection by a certified clinical psychologist. In contrast with self-report questionnaires the interview resulted in a clinical decision being made as to whether or not an affective or anxiety disorder had been present. According to the ICD-10 criteria affective disorders were diagnosis F30–F39. Anxiety disorders comprised diagnosis F40–F43.

Clinical affective or anxiety disorders were defined as those which met the ICD-10 criteria for these disorders. A subclinical form of anxiety or affective disorders was diagnosed when subjects did not fully meet these criteria, but reported elevated symptomatology above the cut-off scores in the respective self-report scales.

Statistical analysis

The prevalence of an affective and anxiety disorder was adjusted for gender and age according to the age and gender distribution in a representative sample of diabetic patients, who participated in the German National Health survey [32]. To determine the impact of diabetes-specific and non-specific risk factors of the occurrence of clinical and subclinical forms of affective and anxiety disorders two separate multivariate logistic regression analyses for each disorder were performed. The relative risk for having a clinical or a subclinical disorder was assessed compared with the respective group with no sign of these mental disorders (i.e. these with negative screening results in the respective questionnaires). Diabetes-specific (type of diabetes, disease duration, HbA_{1c}, number of late complications) and diabetes-non-specific predictor variables (gender, living alone, age, education) were integrated in the model. Continuous predictor variables such as age, HbA_{1c} and disease duration were divided in tertiles.

Results

An elevated depression score above the cut-off in the BDI or CES-D yielded 122 subjects of the diabetic sample (31.4%; age and gender adjusted 33.6%). In a clinical interview 49 subjects were assigned a diagnosis of depression according the ICD-10 (12.6%; age and gender adjusted 13.3%). Compared with a non-diabetic reference population (prevalence 6.3%) the prevalence of clinical affective disorders was approximately twofold higher in the diabetic sample. Differential diagnoses were bipolar affective disorder ($n = 1$; 0.25%), depressive episode ($n = 16$; 4.1%), recurrent depressive episode ($n = 25$; 6.4%), persistent affective disorder ($n = 5$; 1.3%), and other affective disorders ($n = 2$; 0.5%). The positive predictive value for clinical diagnosis of depression based on a positive screening result was 38.4% for the BDI and 53.2% for the CES-D. These positive predictive values for these screening instruments are comparable to the literature [33,34]. In addition to

the criteria-based diagnoses of affective disorders, 73 diabetic patients (18.8%; age and gender adjusted 20.0%) were classified as subclinically depressed.

In the anxiety questionnaire 98 patients had an elevated score in the STAI (25.2%; age and gender adjusted 25.2%). In the diagnostic interview 23 subjects were diagnosed with an anxiety disorder (5.9%; age and gender adjusted 5.0%). The frequency of criteria-based anxiety disorders was lower in diabetic patients compared with a non-diabetic reference sample (prevalence of 9.0%). Differential diagnoses were phobic anxiety disorders ($n = 7$, 1.9%), other anxiety disorders ($n = 3$; 0.8%), obsessive-compulsive disorders ($n = 2$; 0.5%) and reaction to severe stress and adjustment disorders ($n = 11$; 2.8%). Thus the positive predictive value for receiving a clinical diagnosis of an anxiety disorder based on an elevated STAI score was 23.2%. Evidence for a subclinical anxiety disorder was found in 75 diabetic patients (19.3%; age and gender adjusted 22.1%).

As with the affective disorders gender- and age-adjusted prevalence rates were comparable to the unweighted rates.

The prevalence of anxiety and comorbid affective disorders was 1.8% (male participants 1.2%, female participants 2.7%), higher than in a non-diabetic German population with a rate of 0.5% (male participants 0.33%, female participants 0.7%) or which would be expected by chance [14]. Comorbidity of these psychiatric disorders, assessed by a questionnaire, was remarkable higher. An elevated score in one of the depression questionnaires and in the anxiety questionnaire occurred in 21.4% of the participants (BDI and STAI 19.3%; CES-D and STAI 17.2%). The rate for comorbid depression and anxiety symptoms was 17.2% in male participants (BDI and STAI 17.3%; CES-D and STAI 11.9%) and 28.4% in female participants (BDI and STAI 23.0%; CES-D and STAI 26.0%) (Fig. 1).

The relative high prevalence of comorbid affective and anxiety symptoms is not surprising as the depression and anxiety questionnaires were highly correlated (BDI and STAI $r = 0.80$; and CES-D and STAI $r = 0.79$).

The numbers and rates for subclinical and clinical affective and anxiety disorders according to different socio-demographic and disease-specific risk factors are shown in Tables 2 and 3. For each of the two psychiatric disorders two separate logistic regression analyses were performed, predicting either a clinical or subclinical form of these disorders.

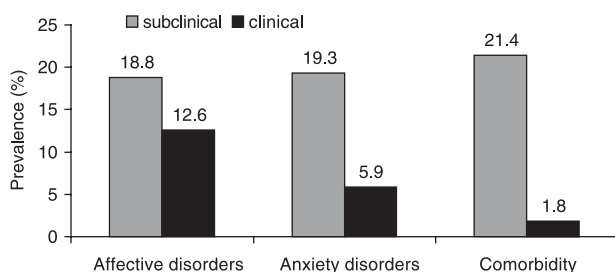


Figure 1 Prevalence of affective disorders, anxiety disorders and their comorbidity.

Significant demographic factors for being clinically depressed were female gender, younger age and living alone. Socio-economic factors, as indicated by education level, did not play an important role. Disease-specific risk factors were insulin-treated Type 2 diabetes, elevated HbA_{1c} levels and the occurrence of severe hypoglycaemia in the past year. The number of late complications and disease duration were not associated with a clinical form of an affective disorder. This model showed an appropriate goodness of fit ($\chi^2 = 37.2$; $P = 0.001$; Nagelkerke $R^2 = 0.194$).

The logistic regression analysis for predicting a subclinical form of an affective disorder demonstrated similar predictive factors. Female gender, insulin-treated Type 2 diabetes and hypoglycaemia problems were significant statistical predictors, glycaemic control did not reach significance. Compared with the clinical form of depression the association between risk factors and subclinical depression was weaker. This is indicated by a significant but more moderate goodness of fit of the logistic regression model ($\chi^2 = 25.2$; $P = 0.047$; Nagelkerke $R^2 = 0.11$).

Logistic regression models of clinical and subclinical forms of anxiety disorders did not reach significance and showed only a moderate goodness of fit (clinical: $\chi^2 = 15.7$, $P = 0.399$, Nagelkerke $R^2 = 0.12$; subclinical: $\chi^2 = 22.3$, $P = 0.100$, Nagelkerke $R^2 = 0.09$). The only significant single predictor for a clinical anxiety disorder was younger age. For a subclinical form of anxiety disorder, female gender, Type 2 diabetes with and without insulin and a younger age were significant predictors.

Supplementary analysis

We performed four logistic regression analyses with the dependent variables clinical and subclinical anxiety and affective disorders. Independent variables represented the following late complications: retinopathy, nephropathy, neuropathy, coronary heart disease, stroke, peripheral vascular disease and diabetic foot syndrome (each coded dichotomously with yes or no). Neither the model for clinical ($\chi^2 = 6.3$; $P = 0.502$; Nagelkerke $R^2 = 0.032$) nor subclinical affective disorders ($\chi^2 = 4.3$; $P = 0.741$; Nagelkerke $R^2 = 0.020$) reached significance. The same was true for clinical ($\chi^2 = 6.8$; $P = 0.454$; Nagelkerke $R^2 = 0.052$) and subclinical anxiety ($\chi^2 = 7.7$; $P = 0.356$; Nagelkerke $R^2 = 0.030$). In all four models, there was no significant association with one specific late complication and the dependent variable.

Discussion

The prevalence of 12.6% for clinical affective disorders was similar to the previously demonstrated prevalence of 11.4% in diabetic patients [3]. This was twofold higher than in the non-diabetic German reference population [35]. In addition, 18.8% of the sample may have been experiencing a subclinical affective disorder with elevated depressive symptoms in self-report scales. Altogether 31.4% of the diabetic patients reported elevated depressive symptomatology; this is similar

Table 2 Subclinical and clinical affective disorders in subgroups and multivariate odds ratios (OR) based on logistic regression analysis

Variable	No depression <i>n</i> = 266	Subclinical <i>n</i> = 73	OR (95% CI) no disorder/subclinical	Clinical <i>n</i> = 49	OR (95% CI) no disorder/clinical
Sex					
Male	176 (73.7)	40 (16.7)	1 (—)	23 (9.6)	1 (—)
Female	90 (60.4)	33 (22.1)	2.0 (1.1–3.8)‡	26 (17.5)	3.2 (1.5–6.8)‡
Age (years)					
18–48	93 (67.9)	28 (20.4)	1 (—)	16 (11.7)	1 (—)
49–62	87 (64.4)	24 (17.8)	0.8 (0.3–1.7)	24 (17.8)	0.9 (0.4–2.3)
> 62	86 (74.1)	21 (18.1)	0.5 (0.3–1.3)*	9 (7.8)	0.2 (0.1–0.6)‡
Living alone					
No	219 (71.8)	55 (18.0)	1 (—)	31 (10.2)	1 (—)
Yes	44 (56.4)	18 (23.1)	1.5 (0.6–3.8)	16 (20.5)	2.5 (1.1–5.6)†
Education					
Less than high school	152 (68.8)	40 (18.1)	1 (—)	29 (13.1)	1 (—)
High school	70 (67.3)	22 (21.2)	1.4 (0.7–2.7)	12 (11.5)	0.8 (0.3–1.9)
College	44 (69.8)	11 (17.5)	1.3 (0.6–2.9)	8 (12.7)	1.2 (0.4–3.1)
Disease type					
Type 1	107 (74.8)	22 (15.4)	1 (—)	14 (9.8)	1
Type 2 without insulin	70 (72.9)	16 (16.7)	1.3 (0.5–3.3)	10 (10.4)	2.2 (0.6–7.9)
Type 2 with insulin	89 (59.7)	35 (23.5)	3.6 (1.5–8.4)‡	25 (16.8)	5.0 (1.7–14.5)‡
Disease duration (years)					
< 6	81 (66.9)	26 (21.5)	1 (—)	14 (11.6)	1 (—)
7–16	95 (66.9)	28 (19.7)	0.7 (0.3–1.4)	19 (13.4)	0.8 (0.3–2.4)
> 16	90 (72.0)	19 (15.2)	0.5 (0.2–1.1)	16 (12.8)	0.9 (0.3–2.1)
HbA_{1c}					
< 7.5	89 (74.8)	19 (16.0)	1 (—)	11 (9.2)	1 (—)
7.5–8.3	86 (66.2)	21 (16.1)	1.4 (0.7–3.0)	23 (17.7)	2.5 (1.0–6.1)†
> 8.3	91 (65.5)	33 (23.7)	1.9 (0.9–3.9)*	15 (10.8)	1.5 (0.6–3.9)
Number of complications					
0	95 (67.9)	29 (20.7)	1 (—)	16 (11.4)	1 (—)
1–2	74 (67.9)	19 (17.4)	0.9 (0.4–2.1)	16 (14.7)	1.1 (0.5–3.0)
> 2	97 (69.8)	25 (18.0)	1.3 (0.5–3.2)	17 (12.2)	1.4 (0.5–4.0)
Severe hypoglycaemia					
No	234 (69.4)	62 (18.4)	1 (—)	41 (12.2)	1 (—)
Yes	32 (62.7)	11 (51.6)	2.7 (1.1–6.9)†	8 (15.7)	4.4 (1.3–14.4)†

Data shown as *n* (%), where not indicated otherwise. (%) are row per cents. OR (95% CI), odds ratios with 95% confidence interval. Figures do not always add up to the total number because of missing data. **P* < 0.10, †*P* < 0.05, ‡*P* < 0.01.

to that reported in a meta-analysis [3]. In summary, there is evidence of a high comorbidity of diabetes and affective disorders in Germany, confirming the transcultural validity of previous studies [3,23]. Screening for affective disorders may be appropriate in diabetic patients [36].

The prevalence of clinical anxiety disorders was 5.9%, which is lower than in the non-diabetic German population. More patients (19.3%) had a subclinical anxiety disorder than a clinical anxiety disorder. Altogether 25.2% reported elevated anxiety symptoms, which is higher than would be expected in a non-diabetic population. These results correspond with elevated rates for anxiety symptoms reported from other studies [6]. However, it seems that these results are primarily caused by an elevated prevalence of subclinical rather than clinical anxiety disorders.

Prevalence observed in this sample and an age- and gender-adjusted prevalence of affective and anxiety disorders were similar, excluding the possibility that the observed prevalence was a consequence of the age and gender composition of the sample.

The different prevalence of clinical anxiety and anxiety disorders do not support the hypotheses that diabetic patients have a higher psychiatric comorbidity in general. Compared with anxiety disorders, affective disorders seem to be more specifically linked to diabetes.

The rate of clinical anxiety with comorbid affective disorder in diabetic patients is higher than expected in non-diabetic subjects [37] although the reason is not clear. Patients with diabetes and one comorbid psychiatric disorder may have a greater burden to cope with than those who ‘only’ have diabetes.

Table 3 Subclinical and clinical anxiety disorders in subgroups and multivariate odds ratios based on logistic regression analysis

Variable	No anxiety <i>n</i> = 290	Subclinical <i>n</i> = 75	OR (95% CI) no disorder/subclinical	Clinical <i>n</i> = 23	OR (95% CI) no disorder/clinical
Sex					
Male	192 (80.3)	35 (14.7)	1 (—)	12 (5.0)	1 (—)
Female	98 (65.8)	40 (26.8)	2.5 (1.4–4.6)‡	11 (7.4)	2.4 (0.9–6.3)
Age (years)					
18–48	100 (73.0)	27 (19.7)	1 (—)	10 (7.3)	1 (—)
49–62	97 (71.9)	28 (20.7)	0.7 (0.3–1.5)	10 (7.4)	0.7 (0.2–2.4)
< 62	93 (80.2)	20 (17.2)	0.4 (0.1–0.9)‡	3 (2.6)	0.2 (0.1–0.9)†
Living alone					
No	236 (77.4)	52 (17.0)	1 (—)	17 (5.6)	1 (—)
Yes	31 (65.4)	21 (26.9)	1.7 (0.9–3.29)	6 (7.7)	1.8 (0.5–5.1)
Education					
Less than high school	166 (75.1)	44 (19.9)	1 (—)	11 (5.0)	1 (—)
High school	77 (74.1)	20 (19.2)	0.9 (0.5–1.8)	7 (6.7)	1.2 (0.4–3.5)
College	47 (74.6)	11 (17.5)	1.0 (0.5–2.3)	5 (7.9)	1.9 (0.5–6.3)
Disease type					
Type 1	113 (79.0)	22 (15.4)	1 (—)	8 (5.6)	1 (—)
Type 2 without insulin	71 (74.0)	20 (20.8)	2.6 (1.0–6.2)†	5 (5.2)	1.7 (0.4–7.7)
Type 2 with insulin	106 (71.1)	33 (22.2)	2.8 (1.2–6.2)†	10 (6.7)	3.5 (0.9–13.6)†
Disease duration (years)					
< 6	90 (74.4)	22 (18.2)	1 (—)	9 (7.4)	1 (—)
7–16	107 (75.4)	28 (19.7)	1.1 (0.5–2.3)	7 (5.0)	0.6 (0.2–2.0)
> 16	93 (74.4)	25 (20.0)	1.3 (0.6–3.1)	7 (5.6)	0.8 (0.2–3.1)
HbA _{1c}					
< 7.5	91 (76.5)	22 (18.5)	1 (—)	6 (5.0)	1 (—)
7.5–8.3	92 (70.8)	29 (22.3)	1.2 (0.6–2.5)	9 (6.9)	1.9 (0.6–6.2)
> 8.3	107 (77.0)	24 (17.3)	0.8 (0.4–1.7)	8 (5.7)	1.3 (0.4–4.5)
Number of complications					
0	102 (72.9)	27 (19.3)	1 (—)	11 (7.8)	1 (—)
1–2	82 (75.2)	23 (21.1)	1.0 (0.5–2.2)	4 (3.7)	0.6 (0.2–2.4)
> 2	106 (76.3)	25 (18.0)	1.2 (0.5–2.8)	8 (5.7)	1.2 (0.3–4.9)
Severe hypoglycaemia					
No	253 (75.1)	65 (19.3)	1 (—)	19 (5.6)	1 (—)
Yes	37 (72.5)	10 (19.6)	1.5 (0.6–3.8)	4 (7.9)	3.0 (0.7–12.2)

Data shown as *n* (%), where not indicated otherwise. (%) are row per cents. OR (95% CI), odds ratios with 95% confidence interval. Figures do not always add up to the total number because of missing data. **P* < 0.10, †*P* < 0.05, ‡*P* < 0.01.

This double burden may place diabetic patients at a greater risk for a comorbid clinical anxiety and affective disorder.

The common occurrence of elevated anxiety and depressive symptomatology is approximately 12-fold higher than the rate of clinical comorbidity of anxiety and affective disorder. In this as well as in other samples [5,23] scores of depression and anxiety questionnaires are highly correlated. This high correlation may be responsible for the observed co-occurrence of depressive and anxiety symptoms. This may also reflect that anxiety and depression symptoms measured by questionnaires are more prone to convergence than symptoms assessed by a criteria-based diagnosis using a structured diagnostic interview.

Established risk factors such as female gender and living alone are also associated with a higher risk of clinical affective disorder in diabetic patients. Interestingly, age over 62 years

was associated with a lower risk of clinical depression in diabetic patients. These data confirm those of Rubin and Peyrot [5]. Perhaps a chronic illness is less unusual in later life and so causes less psychological disturbance. Socio-economic status, as indicated by level of education, was not associated with clinical depression in this sample. Because treatment costs for diabetes are almost all covered by health insurance in Germany, low socio-economic status is not relevant to coping with the disease and may therefore not affect the emotional status of diabetic patients.

Insulin-treated Type 2 diabetes is associated with a higher rate of clinical affective disorders. This could be because insulin treatment in Type 2 diabetes indicates a more chronic stage of the disease, characterized by a higher age, a longer duration, poorer glycaemic control, and a higher rate of complications.

The experience of the failure of previous therapy could also contribute to negative emotional reactions and a higher prevalence of affective disorders.

Higher HbA_{1c} was associated with an enhanced relative risk for clinical affective disorders. This confirms a recent meta-analysis establishing the association between poor glycaemic control and affective disorders [18]. Affective disorders might result in poorer self-care and in a higher HbA_{1c} or vice versa [38]. Interestingly the main difference is between those with good and moderate glycaemic control, suggesting a relationship between poor glycaemic control and risk of clinical depression. Problems with hypoglycaemia can cause emotional distress [39,40]. Thus a higher risk for affective disorders is not unexpected in those experiencing such problems.

In contrast to the published literature [16] there was no association between the number of late complications and affective disorders. This may be because late complications were assessed by medical examination rather than by self-reporting. In general the association between depression and self-reported complications is higher (Fisher's $Z = 0.43$) than the correlation between objectively assessed health status and depression (Fisher's $Z = 0.29$) [19]. Diabetic complications also vary in the degree of functional disability that they cause. Perceived functional disabilities seem to be more important than the number of late complications per se [13,23].

Those with complications leading to a high functional disability, i.e. blindness or kidney failure, did not participate in this study. Thus, self-selection of patients with less disabling late complications may account for the lack of association between depression and late complications.

Subclinical affective disorders were associated with female gender, Type 2 diabetes and the presence of problematic hypoglycaemia. Glycaemic control was not significantly associated with a subclinical affective disorder confirming previous work. Interview-based depression diagnoses are more strongly related to glycaemic control than self-report-based diagnoses of depression [18]. The contradictory data around the association between depression and glycaemic control may be because glycaemic control is related differently to subclinical and clinical affective disorders. Differentiating clinical and subclinical disorders may clarify this relationship [7,18,41].

The study has important methodological limitations. The prevalence of affective and anxiety disorders were determined in those attending a secondary care clinic. Those requiring inpatient treatment generally have a more complicated course than those in the community. They may have to cope with greater burdens associated with diabetes and be more vulnerable to psychiatric disorders. More self-selection may also be present because psychological disturbance is associated with increased help-seeking behaviour [3,5].

This study is cross-sectional, therefore the association between demographic and diabetes-specific variables and affective and anxiety disorders cannot establish causal relationships. Further longitudinal studies are required to explore these important questions in greater detail.

Competing interests

None declared.

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