Can depression be screened by the PAID?

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ABSTRACT: Can depression be screened by the PAID
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Introduction: The PAID questionnaire is an internationally used inventory for identify in emotional problems in patients with diabetes. Depression is a very common mood disorder in diabetes. Thus, we investigated if the PAID questionnaire could be used as a screening instrument to identify subclinical as well as clinical forms of depression in diabetes.
Methods: In an inpatient setting, 376 diabetic patients (37.2% type 1 diabetes, 39.9% female, A1C 8.5±1.6%) completed a German version of the PAID. To identify patients with elevated depressive symptoms. these patients additionally completed German versions of the CES-D and the BDI. Patients who had an elevated score in the CES-D or BDI were invited to a standardized diagnostic interview (CIDI). Depression was diagnosed according to the ICD-10 criteria. ROC-characteristics curves where used to determine the screening ability of the PAID for subclinical (elevated score in CES-D or BDI) as well as clinical depression (fulfilling criteria for depression according to ICD-10) in diabetes.
Results: Subclinical depression (elevated score in CES-D and/or BDI) was present in 32 % of the patients. 49 patients (12.6%) fulfilled the criteria for a clinical depression according to ICD-10. The mean PAID score was 30.6 ±17.8. Correlations between PAID and CES-D (r=.59) and BDI (r=.59) were high. The ROC area under the curve for PAID was .86 for clinical and .84 subclinical depression. According to the ROC characteristics, a cut-off of 33 seemed to be appropriate to identify subclinical depression, resulting in a sensitivity of .79 and a specificity of .74. For clinical depression a cut-off score of 40 resulted in a sensitivity of .82 and a specificity of .76.
Conclusion: The screening abilities of the PAID to identify subclinical as well as clinical depression in diabetes was highly satisfactory in our sample. Thus, the PAID could be used as a screener for depressive symptoms as well as for clinical depression in diabetes. As it is well known that diabetic specific factors like late complications and A1C are associated with depressive symptoms, PAID profiles may be used as well to guide specific interventions targeting depression.

Objective: Depression rates are doubled in people with diabetes. Affective symptoms contribute to a reduced quality of life, poorer self-care, higher A1c-levels and a poorer prognosis. In the face of available effective treatments, screening for depression is recommended to facilitate the early identification of depressed diabetic patients and to avoid these detrimental consequences. Currently only 25% of depressed diabetic patients are identified in clinical care. One reason for this might be a low acceptance of general depression questionnaires by the patients and health care professionals. Therefore we tested the screening performance of the Problem Areas in Diabetes (PAID) questionnaire, a diabetes specific measure of emotional problems related to diabetes.

Methods: An inpatient sample of 376 diabetic patients of the diabetes center Mergentheim (see table 1) completed German versions of the Beck Depression Inventory (BDI) and the Center of Epidemiological Studies – Depression Scale (CES-D) and the PAID. Patients who scored positive in at least one of the two depression questionnaires took part in a standardized diagnostic interview (CIDI). Depression diagnoses were made according to the criteria of the ICD-10. Roc analysis as well as sensitivity and specificity analyses were performed to determine the screening performance of the PAID.

Results: The prevalence of clinical depression was 13.0%, with an additional 18.9% of patients reporting depressive symptoms without fulfilling all criteria for a clinical depression. All PAID items are able to discriminate between the different states of depression (see figure1). Cognitive depressive symptoms related to diabetes such as ”feeling depressed when you think about living with diabetes”, or ”feeling scared when you think about living with diabetes” showed the greatest differences. As expected items like ”feeling unsatisfied with the diabetes physician” had the lowest discriminative potential. The area under the ROC of the PAID to identify clinical depression was .86 ±.03. For sub-clinical depression the area under ROC was .84 ±.02. ROC analysis suggested a cut-off score of = or > 40 for clinical and =>33 for sub-clinical depression to provide an optimal balance between sensitivity (.82, clinical depression; .79 sub-clinical depression) and specificity (.76 clinical depression; .74 sub-clinical depression; see figure 2). A depression subscale of five items was selected using discriminant analysis (see table 2), which demonstrated a screening performance equivalent to the total PAID score. As shown in figure 3 the areas under the ROC of this subscale were similar to those of the total PAID score for identifying clinical depression (AUC = 0.85 ±0.03; p<.001) as well as an elevated depression score (AUC =0.83 ±0.02 p<.001). ROC analysis suggested a cut-off of = or > 8 (sensitivity 0.80, specificity 0.77) for the identification of clinical depression. For elevated depressive symptomatology the cut-off score was = or > 6 (sensitivity 0.76 and specificity 0.78). The positive and negative predictive values are shown in table 3.

Conclusion: Prevalence of depression in our sample is equivalent to the numbers which could be expected from the literature. The screening performance of the PAID for detecting subclinical as well as clinical depression was highly satisfying. A subscale consisting of 5 items had a similar screening performance than the total PAID score. A higher acceptance of the PAID questionnaire than of general depression questionnaires can be expected, since the PAID is asking diabetes specific questions. The measurement of diabetes specific problems can be used for optimization of the therapy as well as for depression screening. Based on these results we would recommend a three stage procedure. The first stage should be the use of the PAID. If the score is lower than 33 no further action would be required. If the score is greater than or equal to 33 and lower than 40, diabetes specific problems described by the patients should be specifically dealt with, and then diabetes specific problems should be re-assessed. A score of 40 or more requires a specific assessment for depression: we would suggest the use of the BDI to enhance the ppv of the screening result on the second stage. The sequential use of the PAID (Cut-off score =>40) and the BDI (cut-off score >12) would increase the ppv for clinical depression to 0.59. If both screening measures are positive, a psychodiagnostic interview should be performed on the third stage to decide if a specific antidepressant therapy is necessary. In summary the PAID questionnaire is a valuable instrument for the simultaneous assessment of diabetes-related stress and depression.

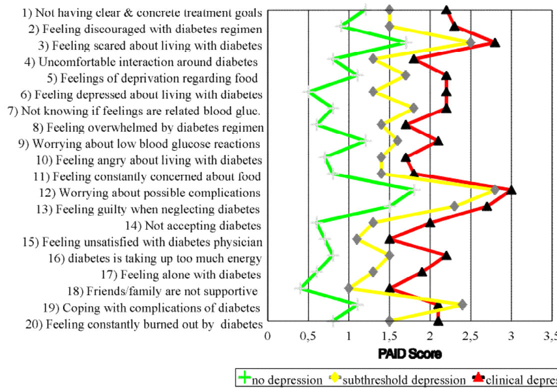

figure 1: Effect of different states of depression on profile of PAID items

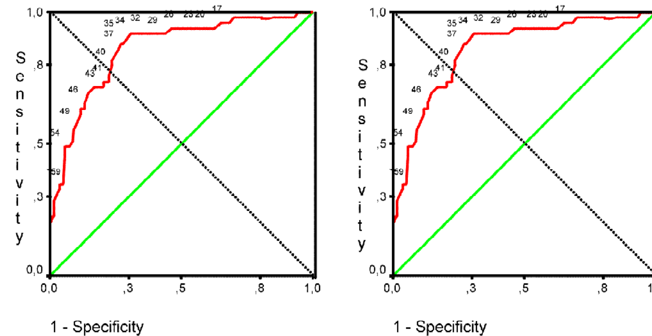

figure 2: ROC analysis of the total PAID score to detect clinical (left figure; area under ROC .86 ±.03) and subclinical depression (right figure, are under ROC .84 ±.02).

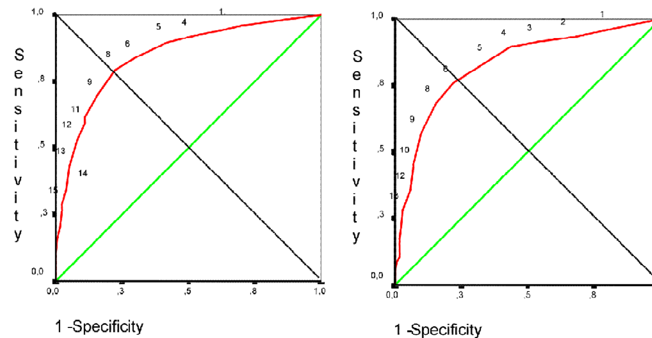

figure 1: ROC analysis of the PAID depression subscale to detect clinical (left figure; area under ROC .85 ±.03) and subclinical depression (right figure, are under ROC .83 ±.02).

table 1: Sample description

	All n=376	no depression n=256	subclinical depression n=71	clinical depression n=49	P
age (yrs)	52.2 ±14.3	52.4 ±14.5	51.6 ±15.2	52.0 ±11.9	.918
% female	39.4	34.8	46.5	53.1	**.022**
diabetes duaration (yrs)	13.5 ±10.7	13.9 ±14.5	12.3 ±10.4	13.1 ±10.7	.494
Diabetes type type 1 (%) type 2 ora (%)l type 2 Insulin (%)	 37.2 38.8 23.9	 40.6 31 28.6	 34.4 46.5 51.0	 25.0 22.5 20.4	.125
A1c (%)	8.5 ±1.6	8.4 ±1.6	8.8 ±1.6	8.5 ±1.3	.325
number of complication	1.3 ±1.4	1.3 ±1.4	1,1 ±1.2	1.2 ±1.3	.552
BDI	8.3 ±8.1	4.0 ±2.9	14.4 ±6.2	22.4 ±8.6	**<.001**
CES-D	15.6 ±10.7	10.0 ±5.1	22.3 ±8.4	33.1 ±9.0	**<.001**
PAID	30.6 ±18.1	23.5 ±14.0	41.3 ±19.6	52.2 16.6	**<.001**

table 2: Results of a discriminant analysis

step	entered item	Wilks L	P
1	PAID 6	86.1	<.001
2	PAID 6 PAID 20	52.2	<.001
3	PAID 6 PAID 20 PAID 18	37.3	<.001
4	PAID 6 PAID 20 PAID 18 PAID 10	29.7	<.001
5	PAID 6 PAID 20 PAID 18 PAID 10 PAID 16	24.7	<.001

table 3: Positive and negative predictive values of different cut-off scores

	Cut -off score	ppv	npv
		clinical depression	
Total PAID score	40	.336	.962
Depression sub-scale	8	.342	.962
		elevated depressive symptoms	
Total PAID score	33	.604	.867
depression sub-scale	6	.519	.913