Title

The Relationship Between Diabetes Distress and Clinical Depression With Glycemic Control Among Patients With Type 2 Diabetes

Journal

Diabetes Care, 33(5)

ISSN

1066-9442

Authors

Fisher, Lawrence
Glasgow, Russell E
Strycker, Lisa A

Publication Date

2010-05-01

DOI

10.2337/dc09-2175

The Relationship Between Diabetes Distress and Clinical Depression With Glycemic Control Among Patients With Type 2 Diabetes

LAWRENCE FISHER, PHD, ABPP[1]
RUSSELL E. GLASGOW, PHD[2]
LISA A. STRYCKER, MA[3]

OBJECTIVE — To clarify previous findings that diabetes distress is related to glycemic control and self-management whereas measures of depression are not, using both binary and continuous measures of depression.

RESEARCH DESIGN AND METHODS — Four hundred and sixty-three type 2 patients completed measures of diabetes distress (Diabetes Distress Scale [DDS]) and clinical depression (Patient Health Questionnaire 8 [PHQ8]). PHQ8 was employed as either a binary (≥10) or continuous variable. Dependent variables were A1C, diet, physical activity (PA), and medication adherence (MA).

RESULTS — The inclusion of a binary or continuous PHQ8 score yielded no differences in any equation. DDS was significantly associated with A1C and PA, whereas PHQ8 was not; both DDS and PHQ8 were significantly and independently associated with diet and MA.

CONCLUSIONS — The lack of association between depression and glycemic control is not due to the use of a binary measure of depression. Findings further clarify the significant association between distress and A1C.

Diabetes Care 33:1034–1036, 2010

Recent studies have drawn a distinction between major depressive disorder (MDD) and diabetes-related distress (DD) among patients with type 2 diabetes (1,2). These studies have generally shown that DD is significantly associated with self-management variables and glycemic control whereas MDD is not (3,4).

MDD has been assessed primarily by a binary diagnostic indicator using a structured interview (e.g., Comprehensive International Diagnostic Interview [CIDI]) (5), whereas DD has been most often assessed by a continuous questionnaire scale score (6). Binary scores contain less information and are less powerful than continuous measures. These differences in measurement may account for why continuous DD scores are associated with diabetes markers and binary scores of MDD are not when both are included in the same or in separate analyses (2). Also, many studies assess depression using symptom inventories not tied to DSM-IV criteria for MDD. Thus, it is difficult to link scores from these measures to well-defined clinical conditions like MDD. We address both problems by assessing MDD with a continuous and a binary questionnaire score tied directly to DSM-IV criteria for MDD, the Patient Health Questionnaire (PHQ) (7), and evaluating the relationship between both MDD measures and continuous Diabetes Distress Scale (DDS) scores on disease management behaviors and glycemic control.

RESEARCH DESIGN AND METHODS

— Data were part of the preintervention assessment of a new Internet-based diabetes self-management education study of patients with type 2 diabetes. Patient characteristics included age, sex, ethnicity (white/nonwhite), education (years), and use of insulin (yes/no). A1C was gathered from recent clinical records. PHQ9 is a 9-item questionnaire tied to DSM-IV criteria for MDD (8). One question, suicidal ideation, was excluded (PHQ8) in keeping with nonclinically based studies (8). Items were scored 0 ("not at all") to 3 ("nearly every day") and were summed to create a total score and a binary score (≥10) for MDD (8). DDS is a 16-item scale ($\alpha = 0.92$) that assesses diabetes-specific distress (6). Six items from the regimen-distress subscale were included. Summed items were scored on a 6-point scale from "not a problem" to "a very serious problem," with a score of ≥3 as the cut point. This subscale was selected because it is directly related to health behaviors and is highly correlated with the scale total (6).

The Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire (9) assessed physical activity (PA), which was calculated as weekly caloric expenditure (10). Diet was assessed by the 7-item Starting the Conversation scale (11), which assesses the frequency of consumption of sugary beverages and fast food. It is sensitive to change in assessing healthy eating patterns (11). Adherence to medications (MA) was assessed by the Hill-Bone Compliance Scale (12) that identifies how often and why respondents miss taking medications. The study was approved by the Kaiser-Permanente, Colorado Institutional Review Board.

RESULTS

— Of 463 patients, the average age was 58.8 years (SD = 9.1), 51.5% were female, mean BMI = 34.8 kg/m^2 (SD = 6.5), 28.0% were nonwhite, and mean A1C = 8.1% (SD = 1.21). PHQ8 was significantly correlated with DDS ($r = 0.40$, $P < 0.001$). Similar to previous

From the [1]Department of Family and Community Medicine, University of California, San Francisco, San Francisco, California; the [2]Kaiser-Permanente, Colorado, Denver, Colorado; and the [3]Oregon Research Institute, Eugene, Oregon.
Corresponding author: Lawrence Fisher, fisherl@fcm.ucsf.edu.
Received 25 November 2009 and accepted 4 February 2010. Published ahead of print at http://care.diabetesjournals.org on 11 February 2010. DOI: 10.2337/dc09-2175.

Table 1—*Standardized regression coefficients (B) for distress and clinical depression on A1C and self-care behavior*

	A1C		Diet		Physical activity		Medication adherence	
Step 1								
Age (years)	−0.24‡		0.13†		−0.01		0.21‡	
Sex (0 = male; 1 = female)	0.03		0.03		−0.19‡		−0.07	
Ethnicity (0 = nonwhite; 1 = white)	0.12†		−0.04		−0.002		−0.08	
Education (years)	−0.03		−0.01		0.08		−0.03	
Insulin (0 = no; 1 = yes)	0.27‡		−0.03		−0.03		−0.006	
Step 2	Binary PHQ8	Continuous PHQ8	Binary PHQ8	Continuous PHQ8	Binary PHQ8	Continuous PHQ8	Binary PHQ8	Continuous PHQ8
DDS	0.31‡	0.30‡	−0.38‡	−0.34‡	−0.13†	−0.13†	−0.16‡	−0.11*
PHQ8	−0.08	−0.03	−0.11†	−0.19‡	−0.03	0.02	0.12†	−0.21‡

A1C, diet, physical activity, and medication adherence are dependent variables in separate hierarchical multiple regression equations. Each was run twice: PHQ8 was entered into Step 2 as either a binary or a continuous variable. Step 1 data are the same in both analyses with the same dependent variable. *$P = 0.05$; †$P = 0.01$; ‡$P = 0.00$.

studies, 51.3% of the sample scored above the cut point for significant diabetes distress and 15.3% scored above the cut point for MDD. Only 22.5% of those with high diabetes distress were clinically depressed, whereas 75.4% of those who reached criterion for MDD reported significant diabetes distress.

In hierarchical multiple regression with A1C, diet, PA, or MA as dependent variables and with patient characteristics entered in Step 1, the inclusion of either a binary or a continuous PHQ8 score in Step 2 yielded no differences in any equation. DDS was significantly associated with both A1C and PA, whereas PHQ8 was not. Higher diabetes distress was associated with higher A1C and lower PA. Both DDS and PHQ8 were significantly and independently associated with diet and MA: poor diet and poor MA were associated with high DDS and high PHQ8. Findings were the same when DDS or PHQ8 individually or together were included in separate equations, or whether continuous or binary DDS and PHQ scores were included. There was no evidence of multi-collinearity among the predictor variables in any analysis.

CONCLUSIONS — The results of this new study suggest that the lack of association between PHQ8 and glycemic control or self-management found in previous studies is not due to the lack of power that sometimes occurs when binary variables are included with continuous variables in the same analyses. The results are similar regardless of the type of PHQ8 or DDS score used, continuous or binary.

Only DD, not MDD, is significantly and positively associated with A1C and negatively associated with PA. In contrast to previous findings in which clinical depression, as assessed by CIDI, was unrelated to any disease management variable (2), both DDS and PHQ8 scores are moderately and independently associated with diet and MA. We speculate that PHQ8-assessed MDD provides a wider lens for inclusion than does CIDI-assessed MDD. A recent study showed that PHQ9 displayed high sensitivity but poor specificity when compared with CIDI among high-risk primary care patients (13), suggesting that PHQ8 records a high number of false positives in this population. This also may have contributed to the somewhat higher prevalence of PHQ8-assessed MDD (15.3%) in our sample than is generally reported in community samples when using interview schedules (2). Thus, PHQ8 may tap into other aspects of mood unrelated to clinical depression that contributes to its association with diet and MA (14).

Limitations include the fact that although the sample was of moderate size ($N = 463$), it was too small to comprehensively investigate potential subgroup variations. Also, the use of only the regimen subscale of the DDS may have reduced relationships between DDS, self-management, and A1C. The findings, however, provide evidence that this subscale alone also has important relationships to these outcomes.

Our results parallel earlier findings that high DD and clinical depression are selectively related to disease management variables, but only DD is linked to A1C and PA. Furthermore, the potential lack of statistical power that is sometimes found when using binary diagnostic variables does not account for the less-frequent associations between clinical depression and diabetes markers. Ongoing screening for both clinical depression and diabetes distress may be warranted in clinical settings.

Acknowledgments— This report was supported by Grant R01 DK-35524 from the National Institute of Diabetes and Digestive and Kidney Diseases.

No potential conflicts of interest relevant to this article were reported.

References

1. Coyne JC. Self-reported distress: analog or Ersatz depression? Psychol Bull 1994; 116:29–45
2. Fisher L, Skaff MM, Mullan JT, Arean P, Mohr D, Masharani U, Glasgow R, Laurencin G. Clinical depression versus distress among patients with type 2 diabetes: not just a question of semantics. Diabetes Care 2007;30:542–548
3. Adriaanse MC, Pouwer F, Dekker JM, Nijpels G, Stehouwer CD, Heine RJ, Snoek FJ. Diabetes-related symptom distress in association with glucose metabolism and comorbidity: the Hoorn Study. Diabetes Care 2008;31:2268–2270
4. Fisher L, Skaff MM, Mullan JT, Arean P, Glasgow R, Masharani U. A longitudinal study of affective and anxiety disorders, depressive affect and diabetes distress in adults with type 2 diabetes. Diabet Med 2008;25:1096–1101
5. Wittchen HU. Reliability and validity studies of the WHO – Composite International Diagnostic Interview (CIDI): a critical review. J Psychiat Res 1994;28: 57–84
6. Polonsky WH, Fisher L, Earles J, Dudl RJ, Lees J, Mullan J, Jackson RA. Assessing psychosocial distress in diabetes: development of the Diabetes Distress Scale. Diabetes Care 2005;28:626–631
7. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary

care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. JAMA 1999;282:1737–1744
8. Kroenke K, Spitzer RL. A new depression and diagnostic severity measure. Psychiat Ann 2002;32:509–521
9. Stewart AL, Mills KM, Sepsis PG, King AC, McLellan BY, Roitz K, Ritter PL. Evaluation of CHAMPS, a physical activity promotion program for older adults. Ann Behav Med 1997;19:353–361
10. Stewart AL, Mills KM, King AC, Haskell WL, Gillis D, Ritter PL. CHAMPS physical activity questionnaire for older adults: Outcomes for interventions. Med Sci Sports Exer 2001;33:1126–1141
11. Fernald DH, Cifuentes M, Niebaurer L, Green L. Transforming primary care health behavior counseling: A new prescription for health from practice-based research networks. In www.prescriptionforhealth.org, 2008
12. Kraemer HC, Stice E, Kazdin A, Offord D, Kupfer D. How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. Am J Psychiat 2001;158:848–856
13. Wittkampf K, van Ravesteign H, Baas K, van de Hoogen H, Schene A, Bindels P, Lucassen P, van de Lisdonk E, van Weert H. The accuracy of Patient Health Questionnaire-9 in detecting depression and measuring depression severity in high risk groups in primary care. Gen Hospital Psychiat 2009;31:451–459
14. Fisher L, Mullan JT, Arean P, Glasgow RE, Hessler D, Masharani U. Diabetes distress but not clinical depression or depressive symptoms is associated with glycemic control in both cross-sectional and longitudinal analyses. Diabetes Care 2010;33:23–28