INPLASY

Prevalence of anxiety and depression in patients with diabetes and their impact on glycemic control: a systematic review and meta-analysis

INPLASY202660074

doi: 10.37766/inplasy2026.6.0074

Received: 16 June 2026

Published: 16 June 2026

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ADMINISTRATIVE INFORMATION

Support - NA.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202660074

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 June 2026 and was last updated on 16 June 2026.

INTRODUCTION

Review question / Objective To systematically evaluate (i) the prevalence of depression and anxiety in people with diabetes and (ii) the quantitative associations between these psychological conditions and glycaemic control (HbA1c).

Condition being studied Psychological comorbidities such as depression and anxiety are increasingly recognized as integral components of the clinical burden of diabetes mellitus. Epidemiological data suggest that individuals with diabetes have nearly twice the risk of major depressive episodes compared with the general population, and anxiety disorders are also markedly overrepresented. These emotional disturbances not only compromise quality of life but also contribute to suboptimal self-management, poor treatment adherence, and worsened glycaemic outcomes.
Previous meta-analyses have reported variable estimates of depression prevalence ranging from 15% to 35% in diabetic populations, with similar heterogeneity for anxiety. Discrepancies may stem from methodological diversity—including differences in study design, patient characteristics, and assessment instruments—as well as regional and cultural variations in symptom reporting. Moreover, although depression and anxiety are both linked to metabolic dysregulation through behavioral and physiological pathways, quantitative evidence on their associations with HbA1c remains inconsistent across studies.
A refined synthesis is therefore warranted. This systematic review and meta-analysis aims to (i) provide updated pooled estimates of depression and anxiety prevalence among individuals with diabetes, and (ii) quantify their associations with HbA1c as an indicator of glycaemic control. By further exploring the moderating effects of study design, scale type, and demographic structure, this work seeks to clarify the extent and sources of heterogeneity in the existing evidence base and to inform targeted psychosocial interventions in diabetes care.

METHODS

Participant or population Adolescents and adults diagnosed with type 1 or type 2 diabetes mellitus. Excluded cases: gestational diabetes and non-diabetic populations.

Intervention Not applicable. This review focuses on prevalence of anxiety/depression and their association with glycemic control, without evaluating clinical interventions.

Comparator Not applicable. No comparative intervention groups were set for this review.

Study designs to be included Observational studies (cross-sectional, cohort), and clinical trials with available baseline data and valid analyses. Excluded reviews, case reports, qualitative studies and conference abstracts without extractable data.

Eligibility criteria Included studies must use validated scales to assess depression and anxiety, and adopt standardized laboratory detection for HbA1c. Excluded non-human studies, duplicate publications, and literature with unvalidated assessment tools.

Information sources Searched PubMed, Web of Science, Embase, APA PsycInfo up to 1 Mar 2026. Also retrieved grey literature from ProQuest Dissertations & Theses Global, clinical trial registries, and screened references of included articles.

Main outcome(s) Sixteen studies (n=14,417) met inclusion criteria. Pooled prevalence estimates were 30% (95% CI 21–42%) for depression and 27% (15–43%) for anxiety, with high between-study heterogeneity. Depression correlated positively with HbA1c (r = 0.22, 95% CI 0.11–0.33) and anxiety with HbA1c (r = 0.27, 95% CI 0.15–0.39). Study design was the dominant source of heterogeneity in depression prevalence, while anxiety prevalence was strongly influenced by female proportion and scale type. Sensitivity analyses confirmed robustness.Primary outcomes: Pooled prevalence of depression and anxiety. Secondary outcome: Correlation between above two psychological conditions and HbA1c (glycemic control indicator). Effect measures include prevalence rate, 95% CI and correlation coefficient r.

Quality assessment / Risk of bias analysis In this study, risk of bias is assessed using a tiered approach based on study design type: randomized controlled trials are assessed using the Cochrane RoB 2.0 tool(9), which evaluates the risk of bias based on randomization, intervention deviations, missing data, outcome measurement, and selective reporting. Cohort studies are assessed using the Newcastle–Ottawa Scale(10) (0–9 points, with 7–9 indicating low risk of bias) based on sample representativeness, comparability, and outcome assessment. Cross-sectional studies are assessed using the AHRQ/NIH Quality Assessment Scale(11); each of the 11 items is coded as "yes" (1 point) or "no/unclear" (0 points), the item scores are summed to yield a total of 0–11, and studies are then categorized as high quality (8–11), moderate quality (4–7), or low quality (0–3), considering study objective and sample representativeness, variable definition and measurement reliability, statistical analysis, and control of confounding. Two researchers independently assess and cross-check all domains, with disagreements resolved through discussion o third-party adjudication.

Strategy of data synthesis All statistical analyses are conducted in R (version 4.4.2; R Foundation for Statistical Computing, Vienna, Austria) using the "meta" and "metafor" packages.

Primary analyses pool study-specific proportions for depression and anxiety using random-effects (DerSimonian–Laird τ^2) with logit transformation and inverse-variance weighting; proportions and 95%CI are back-transformed for presentation. Continuity correction (0.5) is applied for zero cells; CIs are computed by normal approximation (Wilson as sensitivity where needed).

Heterogeneity: Cochran Q, τ^2, I^2 with 95% uncertainty where available, and I^2 values of approximately 25%, 50%, and 75% are interpreted as low, moderate, and high heterogeneity, respectively.

Association meta-analyses (depression/anxiety ↔ HbA1c). Because studies report mixed metrics, we harmonize to correlation coefficients (r) for primary pooling: β→r via t statistics and df (or p-value); OR/RR→r via log(OR)→Cohen's d→r (Chinn). Pooling uses REML on Fisher's z-transformed r; results are back-transformed to r.

Subgroup analysis is pre-set to analyze from the aspects of research design, scale type, and population.

Meta-regression on logit prevalence uses REML with single moderators to avoid overfitting: sample size (N), mean age, male, study design; scale type is explored via stratified analyses.

For association outcomes, we do not run meta-regression (k<10).

Leave-one-out analyses are performed for all pooled outcomes; trial baseline studies are excluded from prevalence analyses; Alternative τ^2

estimator (Paule–Mandel) and transformation (Freeman–Tukey) are used as robustness checks.

Subgroup analysis Stratified analyses by study design, psychological scale type and population characteristics (gender proportion, diabetes type). Explore sources of between-study heterogeneity across predefined subgroups.

Sensitivity analysis Conducted leave-one-out analysis. Excluded trial baseline data for re-analysis. Adopted alternative τ^2 estimator and data transformation methods. Assessed publication bias via funnel plots and Egger's test when eligible.

Country(ies) involved China.

Keywords Diabetes mellitus; Depression; Anxiety; Glycaemic control; Meta-analysisDiabetes mellitus.

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