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REVIEW

What can go wrong with the medication adherence a patient suffers due to diabetes distress? A narrative review

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Keywords

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Abstract

Background: Type 2 Diabetes Mellitus (T2DM) is a major public health concern associated with distress. Distress is a rational emotional response to living with T2DM. Diabetes distress has been found to significantly affect the clinical outcome of T2DM. However, little is known regarding how distress may affect medication adherence. **Objective:** To investigate the relationship between distress and poor medication adherence in people with T2DM. **Method:** A literature search was conducted to identify relevant research articles published from 2014 to 2022 in three electronic databases (Scopus, PubMed, and SpringerLink) regarding “diabetes distress”, “T2DM management” and “medication adherence”. In addition, a search was also carried out using Google Scholar. **Results:** A total of seven articles were identified. Amongst these articles, three studies revolved around evaluating the effect of diabetes distress on blood glucose control. All articles mentioned the significant association between distress and poor medication adherence, leading to seemingly comprehensive findings regarding the impact of diabetes distress on T2DM patients. **Conclusion:** It is important for healthcare providers, particularly pharmacists, to understand the holistic feature of T2DM patients.

Introduction

Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterised by hyperglycaemia, which is caused by insulin function insufficiency (Ngan *et al.*, 2021). Globally, the incidence of DM is estimated that 537 million people in 2021 and is projected to increase to reach 46% by 2045 (IDF, 2021). Glycaemic control and avoiding complications are targets for comprehensive treatment management in T2DM (Hilliard *et al.*, 2016). T2DM patients have to make various kinds of life changes due to the disease they suffer, causing the patient to feel distressed whilst undergoing treatment (Siregar & Hidajat, 2017). T2DM affects physical and mental health. Approximately two-fifths of patients experience mental problems, such as anxiety, depression, and diabetes distress (McMorrow *et al.*, 2021). The latter is the most common psychological

problem in T2DM patients and affects approximately 30% of individuals with T2DM (Snoek *et al.*, 2015).

Diabetes distress is a psychological reaction that triggers emotional distress which is directly related to the burdens and worries, and management of T2DM treatment. These emotions can be related to the treatment received or the process of communicating with healthcare providers (American Diabetes Association, 2022). Various conditions can cause diabetes distress, such as diet control, social relationships, anger, frustration, and worries related to the disease and its treatment (Berry *et al.*, 2015).

Distress will have a negative impact on self-management behaviour and glycaemic control in T2DM patients (Whitebird *et al.*, 2018). Diabetic distress has been found to significantly affect the clinical outcome of T2DM, although little is known about how an

intangible psychological aspect such as distress may affect medication adherence, which is a tangible area of clinical importance. Health workers need to understand the relationship between diabetes distress and medication adherence to provide comprehensive care for T2DM patients. This review aims to investigate whether distress can be associated with poor medication adherence in people with T2DM.

Methods

Design

The keywords used in the database search were a combination of (Diabetes) AND (Distress) AND (Medication Adherence OR Adherence OR Compliance) AND (healthcare). The literature search was conducted electronically, in Scopus, PubMed and SpringerLink databases using the Boolean search method. In addition, manual searches were also performed using Google Scholar. The search was limited to articles published from January 2014 to December 2022 and using English. The limitation of the year of publication of this article is intended to ensure the updating of information and minimize bias due to conditions and situations at that time that are different from current conditions and the information presented is still relevant.

Eligibility criteria

Articles included in this narrative review must meet the criteria of the original research, open access to the full text, assessing distress and adherence to medication use in T2DM patients.

Assessment

All search results articles were analysed and categorised by country, sample size, study design, outcome measures, and findings. The first author contributed to the conception or design of the work; acquisition, analysis, interpretation of data for work and compiling works. The other three authors contributed to the conception or design of the work; final approval of the version to be published and critically revising the draft for important intellectual content.

Results

Figure 1 shows a narrative overview of this study. The article searches on three databases resulted in 144 titles, which is then assessed and analysed. The exclusion criteria were: duplicate titles; reviews, comments, or protocols which do not address distress or medication

adherence; did not assess the relationship between distress and medication adherence. Seven articles were used for the review process (Figure 1). The references used are summarised in Table I.

All articles mentioned the significant association between distress and poor medication adherence, leading to seemingly comprehensive findings regarding the impact of diabetes distress on T2DM patients. Two articles confirmed the significant association between distress and blood glucose control (Alzubaidi *et al.*, 2022; Fayed *et al.*, 2022), whilst one article stated that the predictor of distress was glycaemic control (Kretchy *et al.*, 2020).

Discussion

Management of diabetes medication in daily life can be a burden for the patient to trigger the occurrence of distress. Patients will actively manage their disease if the distress can be identified and controlled (Fisher *et al.*, 2014). The measurement of diabetes distress is carried out with several instruments that have been developed (Lee *et al.*, 2014). DDS and PAID are the most widely used instruments (Schmitt *et al.*, 2016). In this narrative study, diabetes distress was measured using the Diabetes Distress Scale (DDS) and Problem Areas In Diabetes (PAID) instruments with various versions, namely DDS-17 (1-2, 6-7), PAID-20 (3-4), PAID-5 (6) and DDS-2 (5-6).

DDS and PAID are effective instruments with which to measure distress in DM patients because they provide generally comparable results, although there are differences which have been observed in each of these instruments. The PAID instrument assesses dietary-related distress, complications and hypoglycaemia, whilst the DDS instrument assesses healthcare professionals and drug regimen-related distress (Schmitt *et al.*, 2016). The various conceptualisations of diabetes distress appeared in all articles, reflecting the inconsistent terms which define distress.

As alluded to in Table I above, all articles mentioned the significant association between distress and poor medication adherence, leading to seemingly comprehensive findings regarding the impact of diabetes distress on T2DM patients. As many as 59.8% of respondents did not comply with medication, and the main reason for the non-compliance of respondents was due to forgetfulness. The high value of problem areas in diabetes (PAID) was significantly associated with patient non-adherence to medication ($p < 0.001$). Indeed, the burden of diabetes hinders the patient's daily self-care activities, such as medication adherence (Zhang *et al.*, 2021).

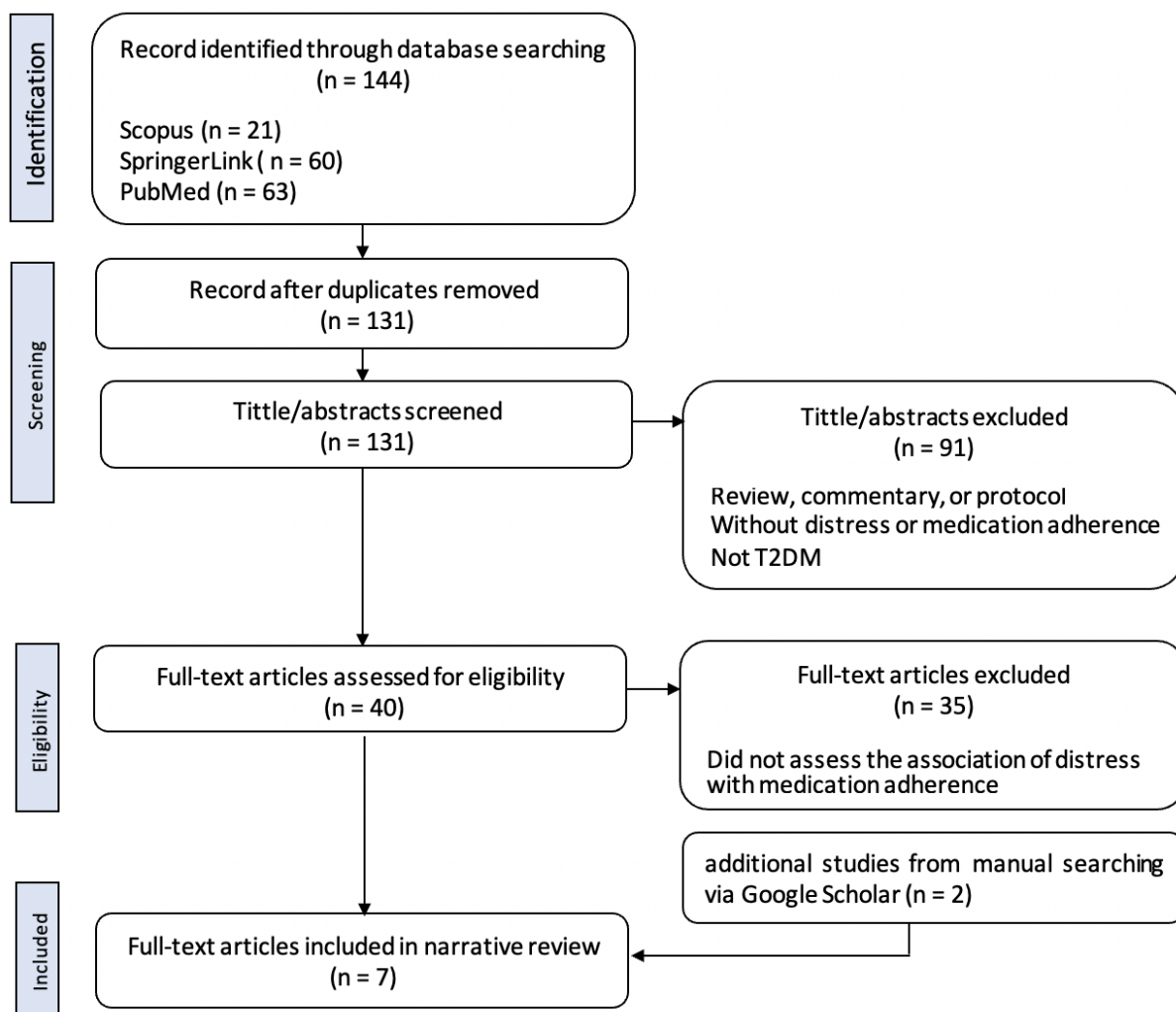


Figure 1: PRISMA diagram of literature search strategies and review procedure

Table 1: Studies meeting the inclusion criteria

Country	Research years	Sample (n)	Study design	Measurement of outcomes	Finding
Australia	Alzubaidi <i>et al.</i> , 2022	696 (Arabic-speaking immigrants: n=392; English-speaking: n=304)	Multicentre cross-sectional	a. Diabetes distress (DDS-17), medication adherence (MMAS-4) and health outcomes b. Conduct an assessment of distress and its relationship with medication adherence c. Assess DD and health outcome (HbA1c)	a. Higher levels of distress, lower medication adherence, worse self-management and lower health outcomes (glycemic control, high blood pressure and total cholesterol) were found in Arabic-speaking immigrants compared to English-speaking participants. b. Respondents who did not adhere to treatment had higher distress scores ($p < 0.001$). c. Diabetes distress is associated with HbA1c but is limited to Arabic-speaking immigrants.
Saudi Arabia	Fayed <i>et al.</i> , 2022	157	Cross-sectional	a. Diabetes distress (DDS-17), self-reported adherence to treatment/SRAT (MMAS-8) and control DM (HbA1c levels) b. Analysis of the relationship between distress with medication adherence and blood glucose control	a. T2DM respondents experienced clinically significant distress, poor adherence and uncontrolled blood glucose control (mean HbA1c was 8.9 ± 2.3). Younger patients showed higher distress compared to older patients. b. Respondents with higher distress were significantly associated with lower

Country	Research years	Sample (n)	Study design	Measurement of outcomes	Finding
				c. Analysing the effect of distress on HbA1c with direct and mediating effects through medication adherence	adherence ($p = 0.001$) and uncontrolled blood glucose ($p = 0.04$). c. Distress and adherence were associated with HbA1c values; an increase in HbA1c values is directly caused by an increase in distress values and indirectly through a mediating effect on medication adherence.
Singapore	Zhang et al., 2021	448	Cross-sectional	a. Percentage of medication non-adherence (Morisky Green Levine Medication Adherence Scale/MGL), median and inter-quartile range diabetes distress (PAID-20) b. The associations of distress with medication non-adherence	a. Patients were non-adherent to treatment by 59.8%, while the median value of distress was five (IQR 5, 31.25), and 21.7% were non-adherent to scheduled appointments. b. Increased distress scores were significantly associated with non-adherence to drug use ($p = 0.001$).
Ghana	Kretchy et al., 2020	188	Cross-sectional	a. Diabetes distress (PAID-20), medication adherence (MARS) and blood glucose levels b. The effect of distress on adherence to drug use c. Association between blood glucose and diabetes distress	a. The results showed that the average score of the patient's distress was 36.0 ± 4.3 . The percentage of patients with high distress scores (PAID score 40) was 44.7% (84/188). The mean scores for adherence and blood glucose control were 21.2 ± 3.6 and 7.8 (IQR: 6.4-11.0), respectively. b. Patients with low medication adherence had significantly high distress scores ($p = 0.001$). c. A significant predictor of distress was blood glucose control ($p < 0.001$). Every increase in blood glucose levels will result in an increase in the value of depression in T2DM patients (OR: 1.12, 95% CI: 1.04-1.21).
America	Aronson et al., 2020	166	Mixed-methods	a. Diabetes distress (DDS-2), medication adherence (MMAS-4) b. The bivariate relationships between medication adherence and diabetes distress	a. In this study, data obtained on the average score of distress and compliance are 2.56 (range 1-6) and 2.54 (range 0-4). Females had significantly higher diabetes distress ($p = 0.006$) and lower medication adherence ($p = 0.038$). b. Diabetes distress was associated with medication adherence ($r = 0.304$, $p < 0.01$).
Malaysia	Chew et al., 2018	338	Cross-sectional	a. Diabetes distress (DDS-17, DDS-2 and PAID-5), medication adherence (MMAS-8) and clinical measures (HbA1c) b. Diabetes distress was associated with medication adherence	a. Distress scores as measured by PAID-5 yielded the highest score (40.1 (27.0)) and DDS-17 yielded the lowest distress score (27.3 (19.2)). The median (IQR) MMAS-8 score was 6.8 (2.8). The mean (SD) for SDSCA and HbA1c were 3.4 (1.3) and 8.3 (2.0). b. There is a relationship between distress as measured using PAID-5 with medication adherence and self-care activities.
Pakistan	Arif et al., 2018	349	Cross-sectional	a. Diabetes distress (DDS-17) b. Relationships between diabetes distress and compliance with medical treatment	a. Diabetes distress was in the moderate category with an average score of 2.55 ± 0.75 . The number of respondents who experienced distress was 266 (76.2%) with details of respondents with moderate distress levels as many as 164 (47%) people and high distress as many as 102 (29.2%) people. b. There is a relationship between distress and adherence to medication use, demographic background, monthly income, complications, glycaemic control ($p < 0.0001$) and education level ($p = 0.015$)

Medication adherence had 3.1 times higher in patients with low levels of diabetes distress than in patients with high levels of distress (Chew *et al.*, 2018). Poor medication adherence rates were significantly associated with higher stress levels, especially regimen-related distress and interpersonal distress. Furthermore, the effect of diabetes distress on HbA1c was mediated by adherence to treatment. Patients with severe diabetes distress will discontinue medication and their glycaemic control may deteriorate (Fayed *et al.*, 2022). With every increase in blood glucose levels, there will be an increase in diabetic distress, so a significant predictor of distress is blood glucose level ($p < 0.001$) (Kretchy *et al.*, 2020).

Diabetes distress independently affects patient adherence to using drugs (Aronson *et al.*, 2020). Interventions for distress in T2DM patients have a major impact on blood glucose control, especially for those with high rates of early diabetes distress. Interventions should be in the form of health promotion activities, especially drug use compliance, self-management activities, and increasing self-efficacy (Alzubaidi *et al.*, 2022). Reducing diabetes distress through increasing self-efficacy and self-care behaviour to increase medication adherence is an intervention that needs to be done in health services (Arief *et al.*, 2018). As a result of this study, it is recommended that healthcare providers assess, and routinely monitor, diabetes stress and barriers to diabetes self-management. Interventions to monitor diabetes distress have a positive impact on medication adherence, which will improve disease control and reduce downstream consequences as well as healthcare expenditures (American Diabetes Association, 2018).

Conclusion

This may further push the need for healthcare providers, particularly pharmacists, to understand the holistic features of the patient.

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