



**Psychological Risk Factors for Worsening Prognosis of Diabetes Mellitus
Patients during the COVID-19 Pandemic**
**Faktor Risiko Psikologis Terjadinya Perburukan Prognosis Penderita Diabetes
Mellitus pada masa Pandemi Covid-19**

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ABSTRACT

People with diabetes are at a higher risk of psychological problems during the COVID-19 pandemic. A literature review was conducted by searching five databases, and 24 papers were included in the study. The review found that diabetes patients experience stress and difficulties in managing their disease during the pandemic, which can lead to hyperglycemia. Hyperglycemia is a risk factor for a worse prognosis in people with COVID-19. The reciprocal mechanisms of COVID-19 and diabetes management increase the risk of a worse prognosis for both conditions. The mental pressure felt by diabetics requires special attention and intervention from health workers. Diabetes self-management education should focus on diet, exercise, medication adherence, prevention of hypoglycemia, and healthy coping patterns. Teleconsultation can be an alternative to providing mental health services to diabetes mellitus sufferers during the COVID-19 pandemic. The study highlights the importance of addressing the psychological risk factors in people with diabetes during the COVID-19 pandemic to improve their overall health outcomes.

Keywords: COVID-19, diabetes mellitus, stress, prognosis, psychological

ABSTRAK

Penderita diabetes memiliki risiko yang lebih tinggi mengalami masalah psikologis selama pandemi COVID-19. Sebuah tinjauan literatur dilakukan dengan mencari di lima basis data, dan 24 makalah disertakan dalam penelitian ini. Kajian ini menemukan bahwa pasien diabetes mengalami stres dan kesulitan dalam mengelola penyakit mereka selama pandemi, yang dapat menyebabkan hiperglikemia. Hiperglikemia merupakan faktor risiko untuk prognosis yang lebih buruk pada penderita COVID-19. Mekanisme timbal balik antara manajemen COVID-19 dan diabetes meningkatkan risiko prognosis yang lebih buruk untuk kedua kondisi tersebut. Tekanan mental yang dirasakan oleh penderita diabetes membutuhkan perhatian dan intervensi khusus dari tenaga kesehatan. Edukasi manajemen diri diabetes harus berfokus pada diet, olahraga, kepatuhan minum obat, pencegahan hipoglikemia, dan pola koping yang sehat. Telekonsultasi dapat menjadi salah satu alternatif dalam memberikan layanan kesehatan mental kepada penderita diabetes melitus di masa pandemi COVID-19. Penelitian ini menyoroti pentingnya mengatasi faktor risiko psikologis pada penderita diabetes selama pandemi COVID-19 untuk meningkatkan hasil kesehatan mereka secara keseluruhan.

Kata kunci: COVID-19, diabetes melitus, stres, prognosis, psikologis

INTRODUCTION

People with diabetes mellitus (DM) are among the vulnerable groups in pandemic COVID-19 situation (Orioli et al., 2020). The number of diabetes mellitus worldwide currently reaches 463 million (International Diabetes Federation). In Europe, people with diabetes have reached 59 million people. The Middle East and North Africa region has reached 55 million, and the West Pacific region has reached 163 million people. These data show the high number of people with diabetes mellitus as a population at risk from the COVID-19 pandemic.

DM sufferers are not only prone to experiencing physical disorders related to disease; they are also prone to experiencing psychological problems. Depression is thought to be two to three times as likely to affect someone with diabetes than someone without it (Bădescu et al., 2016), especially women who are older than 50, have only completed secondary school, and have poor incomes (Mulyani & R. Triscyananda Defvyanto, 2023). Studies from many nations examining depression rates in diabetics back up this assumption. In the European region, a cross-sectional study conducted on 216 individuals aged 20-45 years with type 2 diabetes in Denmark stated that 24% of participants had high diabetic distress (Bo, Pouwer, Juul, Nicolaisen, & Maindal, 2019). Meanwhile, in Spain, 17.2% of the 3,443 people with diabetes mellitus had depression (Salinero-Fort et al., 2018). In the Asian region, research related to depression in DM shows that of the 893 residents in China who have diabetes, 56.1% of them suffer from symptoms of depression (Sun et al., 2016). Another study in South Korea showed that 28.8% of the 753 diabetics as study participants experienced depression (Park et al., 2015).

During COVID-19 pandemic, diabetes mellitus people are a group that are prone to experiencing psychological problems and can experience worsening psychological conditions during the pandemic (Banerjee, Chakraborty, & Pal, 2020a). Distress experienced by diabetic patients will have a negative impact on the patient's diabetes management behavior. This is because the distress experienced by diabetic patients will make it more difficult to manage diabetes (Whitebird, Kreitzer, Vazquez-Benitez, & Enstad, 2018). Diabetics who experience distress will generally have low levels of adherence to medication, diet control, physical activity, and overall self-management (N. Kumar et al., 2017; Quek et al., 2019; Riyanti & Sutantri, 2022). This will have an effect on diabetes patients' glucose control (Wong, Afshar, Zhang, Elliott, & Tang, 2015). Poor glycemic control can cause problems during the COVID-19 pandemic. Inadequate Glycemic control is closely linked to major infections (Erener, 2020). Although the mechanism for the worsening process cannot be explained in detail, In COVID-19 patients, inadequate glucose management is a risk factor for increasing severity and mortality (Singh & Singh, 2020). This is supported by a cohort study in China which showed that adequate blood glucose management was associated with better results in COVID-19 participants (Zhu et al., 2020). Another study stated that diabetes distress affects cardiovascular disease (Amirudin & Yunitasari, 2021). Therefore, it can be concluded that diabetes patients' stress can indirectly correlate with worsening physical conditions during the COVID-19 pandemic. Anchored by these facts, factors that cause distress experienced by diabetic patients must be understood by health workers. Because a good understanding of diabetes distress will help health workers actively engage in discussions with patients who are struggling to overcome the diabetes distress they feel (Berry, Lockhart, Davies, Lindsay, & Dempster, 2015). This article aims to discuss various psychological risk factors for diabetes mellitus sufferers during the COVID-19 pandemic.

METHOD

The systematic review research approach was applied in this study. Electronic searches for articles are sourced from five databases, namely ScienceDirect, EBSCO, ProQuest, Google Scholar, and PubMed. PRISMA was used to assess the quality of the publications based on predetermined criteria for acceptance and exclusion. The selection and selection of documents, is carried out as illustrated in Figure 1. The inclusion criteria in this study are articles that discuss related stress and diabetes mellitus and the COVID-19 pandemic. Articles are research articles, letters of editor, literature reviews, and systematic reviews. Meanwhile, the exclusion criteria in this study were articles that did not use English. The following keywords were utilized in the literature search process: “distress,” stress,” “psychological”, “diabetes,” and “COVID-19.” The number of articles obtained from five databases was 788. The ninety nine articles were remove as it were found double and a total of 900 articles were discarded because their titles and abstracts did not match the objectives of this research. Finally, The number of sixty-one of full-text journals were evaluated, nevertheless, we found 24 articles that were suitable for our objective and the inclusion and exclusion criteria. The PRISMA graphic below depicts the article selection process:

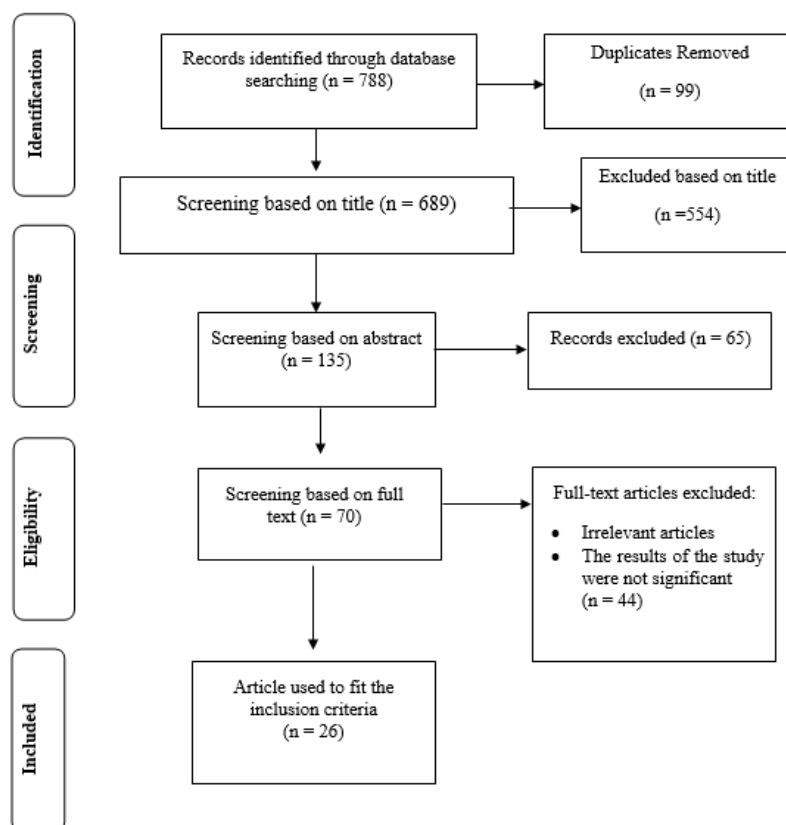


Figure 1. Articles selection diagram.

RESULTS AND DISCUSSION

The psychological risk factors for diabetic people throughout the COVID-19 epidemic concern a worse prognosis than individuals without diabetes mellitus, Diabetes is tough to manage their illness, and feelings of loneliness and financial pressure. Concerns about diabetes clients with COVID-19 are related to the female gender, sufferers of type 1 diabetes, diabetes mellitus complications, sufferers who feel isolated and lonely, and diabetes distress. Difficulties in managing diabetes mellitus during a pandemic are related to disease management barriers, decreased duration of exercise, increased consumption of carbohydrates, difficulty communicating with health workers, and pressure on lifestyle changes.

This study indicates that the distress regimen in diabetes mellitus accompanied by emotional burden is associated with decreased sleep time and low self-efficacy in DM patients. Stress and difficulties of DM sufferers in disease management can affect diabetes mellitus glycemic control. Poor glycemic control can lead to hyperglycemia. Hyperglycemia increased risk for worsening prognosis in people with COVID-19. Therefore, at this time, diabetes self-management education should focus on diet, exercise, medication adherence, prevention of hypoglycemia, and healthy coping patterns. Table 1 provides a comprehensive review of the research findings..

No.	Author and Year	Main Findings
1	Banerjee, M., Chakraborty, S., & Pal, R. (2020a).	Diabetics can endure psychological deterioration and hurdles to diabetes control, necessitating a patient-centered approach in diabetes care offered by a multidisciplinary team in the midst of the COVID-19 epidemic.
2	Joensen et al (2020)	The number of respondents is 2340. More than half of respondents are worried that they will have a worse prognosis if they infected with COVID-19. Logistic regression showed that being a woman, suffering from type 1 diabetes, having complications of diabetes and diabetic distress, feeling isolated and lonely, and changes in diabetes behavior were associated with feeling more worried about

		COVID-19 and diabetes.
3	Guan et al., (2020)	According to the data from 1590 COVID-19 patients, the most common co-existing medical conditions were hypertension (16.9%) and diabetes (8.2%). It was found that COVID-19 patients with comorbidities had worse clinical outcomes compared to those without any underlying conditions. Additionally, the number of co-morbidities a patient had was also associated with a poorer clinical outcome.
4	Kumar et al., (2020)	The prevalence of diabetes among COVID-19 patients is estimated to be around 10%, which may be comparable to the rates found in the general population. COVID-19 patients with diabetes are at a higher risk of developing severe illness, with a doubled risk of death from the virus.
5	Zhu et al., (2020)	Diabetes status raises the demand for medical intervention in COVID-19 cases. COVID-19 patients with diabetes have a higher risk of death. Maintaining well-controlled blood glucose levels is associated with improved outcomes in infected individuals.
6	Tanenbaum, ML, Kane, NS, Kenowitz, J., & Gonzalez, JS (2016).	The individuals expressed that their distress due to diabetes was linked to a lack of support or understanding from others, challenges in communicating with healthcare providers, and the stress of adapting to lifestyle changes. Those using insulin reported significant emotional distress due to the demands of their insulin regimens. On the other hand, those not using insulin were more inclined to mention the burden of managing other medical conditions.
7	Rose KJ, & Scibilia R. (2020)	The management of diabetes for individuals with diabetes has become more challenging due to the COVID-19 pandemic. Therefore, it is crucial to take a systematic approach to minimize risks whenever feasible, while also recognizing that everyone requires support at times.
8	Ghosh, A., Arora, B., Gupta, R., Anoop, S., & Misra, A. (2020).	During lockdown, individuals with type 2 diabetes experience decreased exercise time, heightened carbohydrate intake, and increased mental stress, all of which can lead to destabilization of blood sugar levels.
9	Ramkisson, S., Pillay, BJ, & Sibanda, W. (2017).	A negative correlation exists between social support and coping, indicating that higher social support is linked to lower emotional distress. Social support plays a crucial role in assisting individuals with diabetes in managing their condition and improving their adherence to treatment.
10	Mao, W., Yip, C.-MW, & Chen, W. (2019).	The annual direct medical costs per patient can vary significantly depending on the type of complications and increase substantially with diabetes complications, placing patients at great financial risk.
11	Rijal, A., Adhikari, TB, Khan, JAM, & Berg-Beckhoff, G. (2018).	The treatment and management of cardiovascular diseases (CVD), such as diabetes, cancer, and chronic respiratory diseases, have a significant economic impact on families in South Asia.
12	Bermudez-Tamayo, C., Besançon, S., Johri, M., Assa, S., Brown, JB, & Ramaiya, K. (2017).	The total cost of care for individuals with diabetes (DM) is approximately four times higher than for those without diabetes (without DM), amounting to \$77.08 billion and \$281.92 billion, respectively. The difference in costs between the two groups is \$204.84 billion.
13	Fong, JH (2019).	Cardiovascular disease, diabetes, hypertension, and cancer cause significantly higher expenditure among the elderly than other conditions.
14	Gutierrez, JP, Garcia-Saiso, S., & Aracena, BM (2018).	Families with individuals who have diabetes (DM) report health expenditures that are 25% to 34% higher than families without individuals who have DM or hypertension.
15	Morris, JL, & Chasens, ER (2017)	Financial challenges add an extra burden for individuals with diabetes (DM). Those who face financial difficulties are more likely to experience diabetes distress and lower physical and mental quality of life, which contributes to barriers in self-care.
16	Sacks, LJ, Pham, CT, Fleming, N., Neoh, SL, & Ekinci, EI (2020).	The daily lives of people with diabetes have been greatly affected by COVID-19, leading to financial challenges, shortages of food and medicine, and increased mental health burdens. In Australia, medical care has been adapted to minimize the risk of transmission, with a focus on telehealth and remote monitoring.
17	Erener, S. (2020).	Epidemiological studies show that uncontrolled diabetes is a risk factor for many infectious diseases.
18	Singh, AK, & Khunti, K. (2020).	Diabetes is associated with a significantly increased severity and mortality risk in COVID-19 patients, even without other coexisting conditions. Poor blood

		glucose control can exacerbate the severity and death rate in diabetic individuals with COVID-19. While data is limited, no anti-diabetic drug has been found to be beneficial or detrimental to COVID-19 patients.
19	Boulton, A. (2020)	It is crucial for governments to acknowledge that individuals with diabetes may be more susceptible to COVID-19 and face a higher risk of experiencing severe outcomes. Consequently, efforts to minimize the potential for virus exposure are essential. Additionally, diabetics must be equipped to manage complex conditions. Access to care and supplies must be maintained to safeguard them from serious complications.
20	Singhai, K., Swami, MK, Nebhinani, N., Rastogi, A., & Jude, E. (2020).	Individuals with diabetes experience significant stress and psychological adaptation challenges, which are further intensified by the COVID-19 pandemic. A comprehensive multidisciplinary approach is necessary to address the psychological issues that arose among diabetics during the pandemic.
21	Deldar, K., Bahaadinbeigy, K., & Tara, SM (2016)	Teleconsultation aims to eliminate geographic and functional distance between two or more geographically separated healthcare providers. Although teleconsultation offers several benefits, such as improved patient management, some gaps still need to be addressed.
22	Banerjee, M., Chakraborty, S., & Pal, R. (2020b)	Teleconsultation can be an alternative for providing health services in the era of the COVID-19 pandemic
23	Idris (2020)	Psychotherapists can offer counseling services to the community via teleconsultation, which is essential for preventing mental stress and serving as a supportive element for the recovery of COVID-19 patients.
24	Silva, JA d., Souza, ECF d., Echazú Böschemeier, AG, Costa, CCM d., Bezerra, HS, & Feitosa, EELC (2018).	The emotional aspect of individuals with diabetes mellitus significantly impacts their acceptance or rejection of the disease, which can interfere with their personal adherence to medication.
25	Pesantes et al., (2018)	Family support for individuals with diabetes is aimed at motivating and encouraging them to prioritize their health. Families also offer practical support by preparing healthy meals, reminding them to take medication, and engaging in physical activities together. Research aligns with the idea that interventions should focus on family members to enhance self-management practices for type 2 diabetes.
26	Shao, Y., Liang, L., Shi, L., Wan, C., & Yu, S. (2017).	Enhanced social support is linked to increased patient self-efficacy, which in turn is associated with better medical adherence, leading to improved glycemic control.

Table 1. Summary of Selected Studies (n = 26)

During the COVID-19 pandemic, people with diabetes mellitus experienced worries caused by a worse prognostic risk level when experiencing COVID-19 infection when compared to individuals without diabetes mellitus. A study of 2430 adults with diabetes in Denmark shows that diabetics have concerns about the COVID-19 pandemic because they are a vulnerable group (Joensen et al., 2020). Concerns like this arise from various studies that state that diabetics are more at risk during the COVID-19 pandemic. A study with 1590 respondents to confirmed cases of COVID-19 in China showed that patients with comorbidities such as diabetes showed worse clinical outcomes than patients without comorbidities (Guan et al., 2020). This is in line with a meta-analysis study using data from research studies from China, the United States, and France, which showed a two-fold increase in mortality in diabetics infected with COVID-19 compared to patients without diabetes mellitus (A. Kumar et al., 2020).

The second concern of diabetes mellitus sufferers during a pandemic condition also occurs due to not carrying out proper self-management. Regimen-related distress is one of the most common distresses found in people with diabetes mellitus (Silva et al., 2018). Diabetes mellitus self-management is a complex task that DM sufferers need to overcome. One of the challenges and complexities is to keep blood sugar levels within normal ranges. This is due to the many factors that can affect blood sugar levels in people with diabetes. This can cause fear and concern about the instability of blood sugar levels for people with diabetes mellitus, such as the possibility of hyperglycemia and hypoglycemia in them (Tanenbaum, Kane, Kenowitz, & Gonzalez, 2016).

Another problem related to therapy regimens for DM sufferers is making lifestyle changes such as diet and exercise patterns. A population study in Australia explains that people with type 2 diabetes show minimal changes in their lifestyle, such as diet and exercise patterns, after receiving a diagnosis of DM (Chong et al., 2017). Diet and exercise are forms of treatment in diabetes management (Magkos, Hjorth, & Astrup, 2020). Diet and exercise control blood glucose and prevent complications in people with type 2 diabetes (Hamasaki, 2016; Sami, Ansari, Butt, & Hamid, 2017). However, the demands for these lifestyle changes can cause distress in people with type 2 diabetes mellitus (Tanenbaum et al., 2016). The impact of distress treatment regimens accompanied by emotional burdens on diabetes mellitus sufferers namely decreased sleep time and low self-efficacy in DM patients (Zhou et al., 2017). Self-efficacy in DM sufferers is significantly associated with better diabetes management in terms of diet, physical activity and medication (Amer et al., 2018).

The current COVID-19 pandemic has put a new burden on diabetics to carry out diabetes management, which is difficult to do. There is a possibility of an increase in feelings of anxiety and stress (Rose & Scibilia, 2020). The difficulties encountered due to the COVID-19 pandemic in managing diabetes can range from difficulties in accessing health services, difficulty meeting the recommended dietary pattern to difficulty exercising and physical activity due to the imposition of large-scale social restrictions (lockdown) (Rose & Scibilia, 2020). A study of 150 participants in India after 45 days of the implementation of the lockdown showed that they tended to consume more carbohydrates, shorter duration of exercise, so that they rarely monitored their blood sugar independently compared to before the COVID-19 pandemic and the enactment of lockdown (Ghosh, Arora, Gupta, Anoop, & Misra, 2020). This shows that there is a disruption in diabetes management in diabetics during the COVID-19 pandemic.

The aspect of loneliness due to social restriction regulations also adds to psychosocial problems for people with diabetes mellitus. DM sufferers need social support in managing diabetes well. Adequate social support can reduce emotional distress felt by sufferers (Ramkisson, Pillay, & Sibanda, 2017). Families can provide support by being involved in DM sufferer management activities such as preparing healthy food, reminding them to take medication, and sharing physical activities (Pesantes et al., 2018). Better social support is associated with better patient self-efficacy, which will lead to better medical adherence and ultimately lead to improved glycemic control (Shao, Liang, Shi, Wan, & Yu, 2017). The COVID-19 pandemic, especially in several areas that impose large-scale social restrictions (lockdown), can reduce the social circle and support systems in the environment (Kyle Jacques & Renza, 2020). This can have an impact on decreasing social support received by people with diabetes mellitus.

Another thing that affects the level of stress and difficulty in self-management of diabetes mellitus sufferers is financial problems. Diabetes and its various complications and treatment costs can cause financial problems for individuals or families with diabetes mellitus (Mao, Yip, & Chen, 2019; Rijal, Adhikari, Khan, & Berg-Beckhoff, 2018). Research shows that people with diabetes have four times the amount of expenditure than individuals without diabetes (Bermudez-Tamayo et al., 2017). High expenditure due to care costs can cause financial problems for individuals or families, especially in elderly families and families with lower income levels (Fong, 2019; Gutierrez, Garcia-Saiso, & Aracena, 2018; Swe et al., 2018). Thus, financial problems can be an additional stressor to sufferers (Morris & Chasens, 2017). DM sufferers who have financial problems tend to have difficulty taking diabetes drugs regularly, have normal glucose levels checked, and have a worse quality of life both physically and mentally than sufferers who do not have financial difficulties (Morris & Chasens, 2017). The COVID-19 pandemic has an impact not only on the health sector but also on the economic sector. The economic crisis began to emerge due to reduced economic activity during the pandemic. Financial instability during the COVID-19 pandemic does

not only add to the mental burden for people with diabetes mellitus (Sacks, Pham, Fleming, Neoh, & Ekinici, 2020) but it also adds to the difficulty in managing diabetes, namely the difficulty of buying medications such as insulin and checking blood sugar regularly (Hartmann-Boyce et al., 2020).

Stress and difficulties experienced by diabetes mellitus sufferers in carrying out self-management during the COVID-19 pandemic need special attention and handling from health workers. Because this can affect the glycemic control of diabetes mellitus sufferers. Poor glycemic control can cause problems during the COVID-19 pandemic. This is because poor glycemic control is strongly associated with serious infections (Erener, 2020). Although the deterioration mechanism cannot be explained in detail, uncontrolled hyperglycemia is a risk factor for increased severity and mortality in people with COVID-19 (Singh & Singh, 2020). This is supported by a cohort study in China that showed that well-controlled blood glucose correlates with better outcomes in people infected with COVID-19 (Zhu et al., 2020).

Throughout the COVID-19 epidemic, Diabetics still require convenient access to health care. (Boulton, 2020). One form of health service needed is mental health support services (Wulandari & Windarwati, 2023). Support for mental health is needed by diabetics, This is particularly important during the COVID-19 pandemic. (Singhai, Swami, Nebhinani, Rastogi, & Jude, 2020), to help them develop positive coping strategies and practice proper diabetes management. (Banerjee et al., 2020a). One form of convenience in health services is to use teleconsultation. Teleconsultation is a consultation between health personnel and sufferers using communication technology for diagnostic or treatment purposes (Deldar, Bahaadinbeigy, & Tara, 2016). Consultations can be conducted synchronously, for as by phone or video chat, or asynchronously, through email (Banerjee, Chakraborty, & Pal, 2020b). In the face of the COVID-19 epidemic, health workers can use teleconsultation to conduct psychotherapy in the community, such as Cultivating optimistic thought patterns, coping with stress, and employing relaxation techniques (Idris, 2020). Health providers can provide mental health support in the form of education about the relationship between stress and blood glucose and immunity, as well as mindfulness therapy to deal with stress caused by COVID-19 (Singhai et al., 2020), and encouraging diabetics to maintain relationships with friends and family through communication technology such as phone calls and social media so that people with diabetes mellitus do not feel lonely (Kyle Jacques & Renza, 2020). Another study has shown that education through information technology-based applications in DM patients can change their knowledge, attitudes, and behavior to be better (Wardoyo & Kusumo, 2023).

LIMITATION OF THE STUDY

This systematic review do not include researches that does not use English, is not open access and only comes from five research journal databases.

CONCLUSIONS AND SUGGESTIONS

COVID-19 is a pandemic that can increase stress and difficulties for diabetics in managing diabetes. Poor diabetes management can increase the risk of a worse prognosis for COVID-19 and cause anxiety, and mental distress felt by people with diabetes mellitus. The COVID-19 pandemic has created a new burden for people with diabetes mellitus who need special support, attention, and intervention from health workers and changes in behaviour over time. Diabetes self-management education should focus on diet, exercise, medication adherence, prevention of hypoglycemia, and healthy coping patterns. Teleconsultation can be an alternative in providing mental health services

to diabetes mellitus sufferers to increase positive coping patterns and encourage good management of diabetes mellitus during the COVID-19 pandemic.

ETHICAL CONSIDERATIONS

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Conflict of Interest Statement

There are no relevant financial or non-financial interests to disclose for the author

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