

# A Systematic Review of Holistic Care Management of Patients with Diabetes Mellitus

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**Abstract** - Holistic care includes the bio-psycho-social and spiritual care of individuals. The purpose of this study is to explain the management of holistic care in people with diabetes mellitus. The study was done through a systematic review with Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) approach. The search for articles included several databases: Ovid, CINAHL, and PubMed. Determination of keywords was based on PICOT framework, P: any diabetes population, I: holistic care, C: any comparison, O: blood sugar, T: any time. We used MeSH as a keyword. The inclusion criteria in this study were articles written in English, search from journals, articles available in full text, and original articles. Searching in journals is done by using the keywords holistic, diabetes mellitus and blood sugar. There were 10 journals reviewed. The result showed that explained holistic care is related to technology, holistic care program and holistic care related to complementary alternative medicine. The conclusion of this study is that holistic care programs provide significant results in the management of care for people with diabetes mellitus.

**Keywords:** Systematic Review; Holistic; Care; Diabetes Mellitus

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## I. INTRODUCTION

Diabetes mellitus (DM) is one of the priorities of four non-communicable diseases that are the target of follow-up by world leaders. Estimates of 2045 deaths and DM care costs will be a major problem for social, financial and health systems throughout the world [2]. The lifelong treatment process causes DM patients to experience fatigue, stress, and increased life load. This will have an impact on the biological, psychological, social and spiritual disorders of the patient [Centers for Disease Control 3]. Complex conditions further increase blood glucose levels in patients. Blood glucose levels that are not controlled can progressively cause various complications. Complications that occur are heart disease, stroke, kidney failure, DM foot disorder, leg amputation, vision loss and nerve damage [1].

Comprehensive and holistic management is expected to be able to improve the DM patients' mind state, emotions and behavior so that blood glucose is regulated and quality of life is improved [1]. Holistic nursing is an aspect of overall human experience and condition both physically, emotionally, socially, culturally and spiritually on the response and effects of disease experienced by individuals, families, groups, communities, and populations [4, 5]. One of the

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interventions that have a holistic philosophy with traditional approaches in treatment is complementary therapy [5, 6,7]. The purpose of this study is to explain the management of holistic care in people with diabetes mellitus.

## II. METHODS

### • Strategy searching for studies

The literature search was conducted in some databases such as Ovid, CINAHL, and PubMed. Determination of keyword was based on PICOT framework, P: any diabetes population, I: holistic care, C: any comparison, O: blood sugar, T: any time. We used MeSH as a keyword.

### • Study Selection

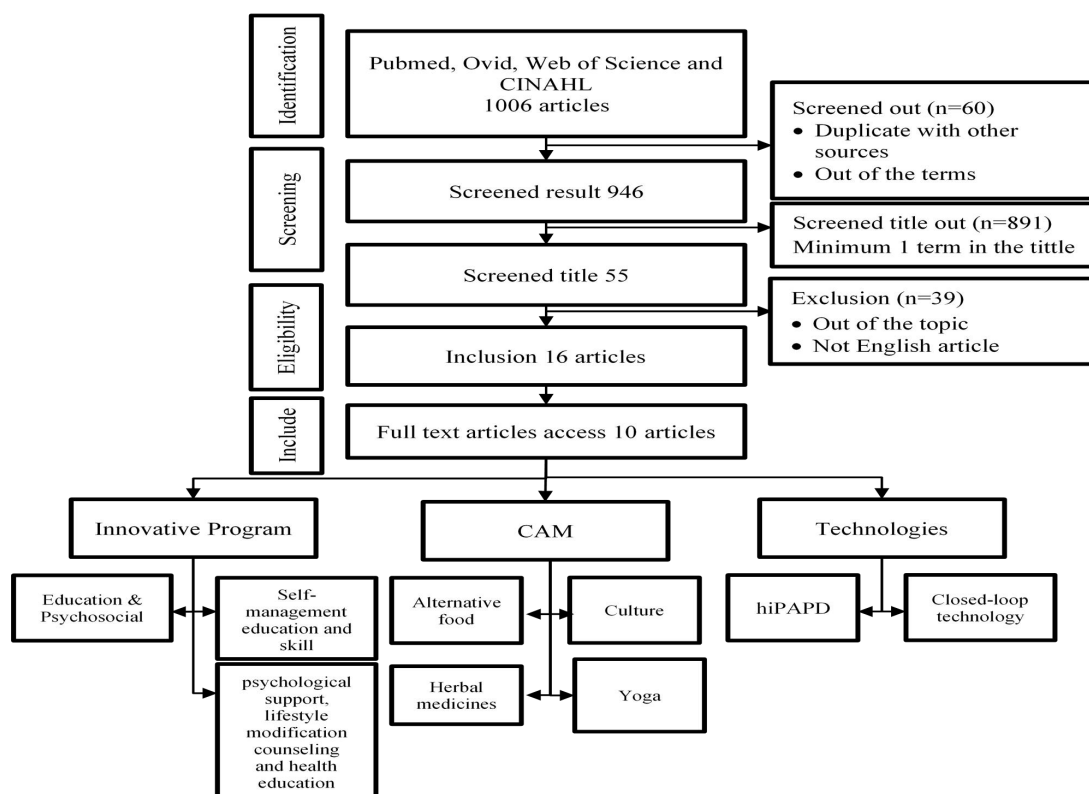


Figure 1 – Article selection Process

The search strategy defines the study selection process and appendix 1. 10 articles fulfilled the inclusion criteria in this study, English articles, search from journals, articles available in full text, and original articles. The search in the journals is done by using the keywords holistic, diabetes mellitus and blood sugar. The study was done through a systematic review with Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) approach.

## III. RESULTS

The result showed holistic care in patients with diabetes mellitus refers to an innovative care program, 4 articles, holistic care using technology, 3 articles, and holistic complementary and alternative medicine, 3 articles.

Table 1. Results of the Study

| Study                          | Title  | Method   | Result   |
|--------------------------------|--|--|--|
| 1. Likitmaskul et al. [8]      | Outcomes of holistic care for patients with type 1 diabetes (T1D) by multidisciplinary teams in Thailand   | Participants in this study are 85 type 1 diabetes and 31 multidisciplinary teams from 25 hospitals.<br>All the patients who initially used the analog insulin regimen were replaced with self-monitoring of blood glucose (SMBG) with a frequency of 4 times per day at no charge. The first year, two "3-day diabetes" groups were formed to help patients, families and teams learn basic DSME. In the second and third years, 4 "2-day diabetes" groups were formed in 4 regional areas of Thailand to provide knowledge and happiness with diabetes. | Diabetes self-management education and skills improved glycemic control.   |
| 2. Bott et al. [9]             | Evaluation of a holistic treatment and teaching program for patients with type 1 diabetes who failed to achieve their therapeutic goals under intensified insulin therapy                  | The 5-day inpatient program had 4-6 patients/group. The program provides group discussions focused on individual counseling concerning motivational aspects, psychosocial problems and coping strategies. The total number of participants the first time was 83, 76 were re-examined after 9-31 months.   | Treatment success was significantly associated with baseline HbA1c, stability of motivation, frequency of blood glucose self-monitoring, control beliefs and change in subsequent outpatient care.   |
| 3. Chalerm Sri, et al. [10]    | The Effectiveness of Holistic Diabetic Management between Siriraj Continuity of Care Clinic and Medical Out-Patient Department   | This study used a retrospective approach. They compared 383 type 2 diabetic patients treated at the CC clinic and 374 patients treated at the internal medicine OPD at Siriraj Hospital between 2007-2011 in terms of baseline demographic data, glycemic control, screening for diabetic complications, and health maintenance.   | The present study showed the continuity of care clinic got greater efficacy rather than usual care at the medical OPD, that's aspect are screening, glycemic control, and prevention of diabetic complications.  |
| 4. Vargas-Lombardo et al. [11] | Technologies to Better Serve the Millions of Diabetic Patients: A Holistic, Interactive and Persuasive ICT Model to Facilitate Self Care, in Extremely Poor Rural Zones of Central America | The hiPAPD model was validated with the support of 107 diabetic patients and families, 90 people related with the friends of the patients and 85 belonging to their social context (representing the community support groups in the three communities under study). On the other hand, ten nurses and nursing aids and five rural doctors were involved is the hiPAPD model validation.   | This was shown with acceptance of the hiPAPD model by all the participants in the project. The model offers service that facilitates education, health, self-care and the social integration in a remote and marginal area.  |
| 5. Young et al. [12]           | Holistic Impact of Closed-Loop Technology on People With Type 1 Diabetes   | Closed-loop technology is a control system for electronic devices that automatically regulates process variables to the desired state or situation. In this study, they reported 3 case studies to explore the impact, benefits and challenges experienced by adults at home for 1 month.  | The first man experiences like "changing lives, a better version of myself". Feeling safe and comfortable using this tool. For 32-year-old women, the participants explained that this tool improves work performance, flexibility, and "the best control I have ever had". A 30-year-old man explained that this tool puts a burden on the mind. All participants reported technological barriers and challenges such as system portability, frequent alarms, and poor device connectivity. |
| 6. Sachdeva et al. [13]        | Cultural determinants: Addressing barriers to holistic diabetes care   | Explanatory Model Interview Catalog interviews with 25 diabetes persons were conducted   | Diabetes care requires cultural factors to provide better results prevention and care services. Diabetes providers are expected to provide interventions that are in line with the patient's culture, and this is also related to local eating habits.   |
| 7. Popoola [14]                | Living With Diabetes   | This study uses an ethnography study.  | Their belief gives them spiritual  |

| Study                   | Title   | Method   | Result   |
|-------------------------|---|--|--|
|                         |   | The sample size of this study is 35 participants.<br>The interviews last about 1 to 3 hours and also involve taking photographs of special artifacts in their home or the working environment. | strength for diabetes management because they all find a way to live a holistic life.  |
| 8. Chawla et al. [15]   | Evidence-based herbal drug standardization approach in coping with challenges of holistic management of diabetes: a dreadful lifestyle disorder of the 21st century | Literature review  | The lack of awareness causes diabetes that suddenly raises the risk of ketoacidosis and diabetic coma; if this is not handled properly it will lead to complex chronic diabetes. This multi-organ dysfunction syndrome that arises through this metabolic disorder can be reduced/postponed by using a holistic approach to herbal medicine. |
| 9. Baldi et al. [16]    | Nutraceuticals as therapeutic agents for holistic treatment of diabetes   | Literature review  | Herbal treatments with the strongest evidence of clinical effects include American ginseng, <i>C. indica</i> , <i>A. vera</i> , <i>T. foenum-graecum</i> , and <i>Opuntia</i> (Nopal). Nutraceutical agents to increase insulin sensitivity and glycemic control are $\alpha$ -lipoic acid, vitamins C and E, and magnesium.                 |
| 10. Kutty and Raju [17] | New vistas in treating diabetes - Insight into a holistic approach  | Commentary   | Blood glucose is effectively controlled when conventional treatment is carried out together with yoga therapy.   |

An innovative holistic care program describes a holistic treatment, education and teaching programs to achieve their therapy goals. Bott et al. [9] found that treatment success was significantly associated with baseline HbA1c, the stability of motivation, frequency of blood glucose self-monitoring, control beliefs and change in subsequent outpatient care. According to the study by Likitmaskul et al. [8], DSME ability of patients and families was improved by the 3-year programs, as this program boosts communication and interaction among the patients and families with healthcare professionals to get reach better outcomes. Chalermisri et al. [10] said that holistic care had a greater impact than usual care; patients who get holistic care were able to achieve the glycemic goal faster than the usual group.

Three articles showed holistic care related to complementary and alternative medicine (CAM). Two of these studies present a model of developing herbal medicine that integrates the Classical Approach of Ayurvedic and Pharmacological Therapies. This is done to find a holistic approach by combining compounds from natural and synthetic medicines. Botany, vitamins, anti-oxidants, minerals, amino acids, and fatty acids, collectively referred to as 'nutraceuticals', are important sources for the new therapies for type 2 diabetes and insulin resistance [15, 16]. Kutty and Raju [17] revealed yoga will help manage stress and anxiety effectively in addition to its role of positive regulation of other systems. Considering its health, there is a need to integrate yoga in conventional treatment regimens as additional/adjunct therapies for effective DM treatment.

Holistic care based on technology showed a significant impact on patients with diabetes mellitus. Vargas-Lombardo et al. [11] developed a Holistic, Interactive and Persuasive Model to Facilitate Self-care of the diabetic Patients (hiPAPD). Other similar programs were developed in India (the "India Diabetes Educator Project"), and the United States ("The California Diabetes Program" and the "Chicago diabetes" initiatives). The hiPAPD model facilitates transparency and mobility of new technologies such as sugar testers, balance scaled weight, pedometers, and blood pressure monitors.

Young et al. [12] provided the experience of participants using closed-loop technology. Closed-loop technology is an artificial pancreas for people with diabetes type 1. Using a control algorithm to modulate insulin delivery based on a continuous glucose monitor. Closed-loop technology greatly impacts improved blood glucose control and psychological

impact. The participants said they felt safe, confident, and healthy. They felt better than usual, like a burden had been lifted.

The qualitative study of holistic care in people with diabetes showed meaningful culture and holistic care. Popoola [14] identified and explained 5 themes; fear and life are the main coping strategies used by participants to balance their lives holistically. The results showed that in the face of their fears, subjects from both cultures never give up their hopes for life. Instead, they often seek and use a holistic and complementary approach while maintaining their faith and spiritual hope.

Sachdeva et al. [13] stated cultural assessment needs to be carried out at various stages - initial assessment, identification of cultural issues in-care, planning for interventions and evaluations that are culturally relevant. Such interventions will likely have a significant impact on diabetes care in the future.

#### **IV. DISCUSSION**

- **Innovative holistic care program**

There were three studies with an innovative program. Bott et al. [9] integrated education, experience and psychosocial program; Chalerm Sri et al. [10] provided a holistic approach consisting of psychological support, lifestyle modification counseling and health education in the clinic; and Likitmaskul et al. [8] implemented self-management education and skill.

Bott et al. [9] made an integrated treatment and teaching program for experienced patients (TTPEP) including psychosocial modules evaluated in 76 patients with Type 1 diabetes mellitus who had been previously educated in specialized diabetes centers and who already performed intensified insulin therapy. In conclusion, the program was capable to improve glycaemic control mainly as a result of a substantial reduction in the incidence of severe hypoglycemia. Mean HbA1c values remained unchanged; nevertheless, the balance between good HbA1c and a low risk of severe hypoglycemia was improved in a number of patients. In addition, the program was able to reduce the frequency of sick-leave days and hospitalization days, although the difference for the latter was not statistically significant. Moreover, the more balanced glycemic control was associated with improved perceptions of self-efficacy, less feeling of external control, and a better relationship with the treating physicians providing outpatient care. However, coping strategies of patients and perceived social support did not change during the follow-up period.

Chalerm Sri et al.'s [10] study showed a significant improvement in glycemic control in patients before-after enrollment into the Siriraj Continuity of Care clinic (CC clinic) and regular out-patient department (OPD) of internal medicine. The result of this study showed the number of diabetic patients in the CC clinic who achieved the target HbA1c of less than 7.0% is higher than the OPD group. The percentage in the OPD group is 24.3% and in the CC clinic group it is 32.1%. The CC clinic focuses on the holistic care management of patients with chronic diseases. It provides a holistic approach consisting of psychological support, lifestyle modification counseling and health education. Our data show the overall benefits of registering with CC clinics in glycemic control, screening rates for diabetes complications, malignancy screening, and other aspects of health care. The authors suggest that the continuity of care, the educational component of the CC clinical program, and the greater amount of time spent with each patient in the CC clinic can at least partially explain our observations.

Likitmaskul et al. [8] revealed diabetes self-management education (DSME) and skills for the patient and family have a significant impact on their DSME skills and glycemic control. At the end of the program, the proportion of patients who achieved HbA1C < 7.5% increased from 18.3% to 24.5%, while patients with HbA1C 7.5–8.5% rose from 23.9% to 30.6%. The status of severe hypoglycemia decreased, the frequency of SMBG measurement increased by an average of

2.87-3.48 times/day. Eating disorders decreased from 35% 20% at the beginning to 11%-5%. The care teams had better self-confidence in giving care and communication with patients and families. This program encourages ongoing communication and interaction among the patients, families and healthcare professionals facilitating better management outcomes.

- Holistic care based on technology

Technology is very important due to era 4.0. Based on the two articles, technology can minimize risk, maximize benefit, be effective and efficient for users, and also help poor conditions. The study of Young et al. [12] showed closed-loop technology has a significant impact by experience on patients with type 1 Diabetes. Vargas-Lombardo et al. [11] also found significant effects related to technology with patient diabetes with low economic status.

Young et al. [12] explored the holistic impact of closed-loop technology in the home setting. In this study, they reported 3 case studies to explore the impact, benefits and challenges experienced by adults at home for 1 month. The first man, 33 years old, experienced like "changing lives." This technology gives users a sense of security and confidence so they feel like "a better version of myself". Major problems such as hypoglycemia at night are reduced to none. Feeling safe and comfortable using this tool, the study participants felt they were missing something when it ended. This experience was in line with other participants who did not experience nighttime hypoglycemia and improved sleep quality, which had an impact on improving diabetes control so as to provide better peace of mind. A 32-year-old female participant explained that this tool improves work performance and flexibility. She described her experience in this tool as "the best control I have ever had," even though she needed to adapt to it. A 30-year-old male participant had difficulty using "very annoying" tools. He explained that this tool puts a burden on the mind. All participants reported technological barriers and challenges such as system portability, frequent alarms, and poor device connectivity. These results give participants experience using closed-loop technology. The closed-loop is associated with improved blood glucose control and psychosocial function.

Vargas-Lombardo et al. [11], found there is clear evidence in the hiPAPD model experiments. hiPAPD is an information technology that helps reduce adverse health conditions in diabetic patients. The hiPAPD model offers services consisting of health education for diabetics, regular health measurements, continuous self-care and social integration of thousands of diabetic patients. It helps with the extreme conditions of the poor and those who live in areas far from primary medical care health centers, which makes it difficult for them to access basic health services.

- Complementary and Alternative Medicine (CAM)

Holistic care using complementary and alternative medicine started a long time ago. Studies from Popoola [14] and Sachdeva et al. [13] found patients with diabetes used alternative food to control their blood sugar. They used herbs or local food to control their blood sugar. The other study said the researcher should develop herbal medicine to reduce diabetes complications [15, 16].

Popoola [14] noted that the spiritual experience and support of their loved ones becomes a hope for life. Holistic balance is the way they look at their problems and their coping strategies allow them to live for years with this disease. Participants explain how they believe in faith and hope in God to survive. In addition, participants used simple daily CAM therapy to address their needs. They know the types and amounts of food that increase or decrease blood sugar, by understanding their own body's needs and changes, and by using simple common sense. They know the benefits of exercise and weight loss as alternative treatments that have a significant impact. They understand the time to use traditional healers, herbal approaches or natural health that can help them cope with diseases so they get a better life.

Chawla et al. [15] mentioned that lack of awareness causes diabetes that suddenly raises the risk of ketoacidosis and diabetic coma; if this is not handled properly it will lead to complex chronic diabetes. This multi-organ dysfunction syndrome that arises through this metabolic disorder can be reduced/postponed by using a holistic approach to herbal

medicine. Further studies are needed to ensure that an effective herbal medicine standardization methodology will be developed, supported by guidelines for regulatory standards for future research efforts.

Baldi et al. [16] recommended the use of herbal medicines in diabetes therapy. Ayurvedic treatment system recommends several polyherbal formulations with anti-diabetic potential. Many studies have reported that more than a thousand different botanicals and nutraceuticals have anti-diabetic activity. Fifty-eight studies were conducted in individuals with diabetes, a statistically significant treatment effect reported in 88% of trials evaluating a single herb and 67% of trials evaluating each vitamin or mineral supplement. Side effects are only mild such as gastrointestinal irritation and nausea. Some nutraceuticals and herbs are considered as complementary approaches for the treatment of type 2 diabetes. Herbal treatments with the strongest evidence of clinical effects include *American ginseng*, *C. indica*, *A. vera*, *T. foenum-graecum*, and *Opuntia* (Nopal). Nutraceutical agents to increase insulin sensitivity and glycemic control are  $\alpha$ -lipoic acid, vitamins C and E, and magnesium.

Kutty and Raju [17] revealed a study conducted by Kyizom et al. [18] which reported the beneficial effects of yoga therapy when included together with conventional medical therapy. Blood glucose is effectively controlled when conventional treatment is carried out together with yoga therapy. Other studies also show stable blood sugar in type 2 diabetes in response to yoga therapy. Kyizom et al. [18] have shown that practicing yoga for 45 days with conventional medicine effectively improves neurocognitive function. A yoga regimen is carried out for at least six days a week under supervision to get better results. Yoga practice creates an internal atmosphere that is conducive from the cellular to the system level. This will help to effectively manage stress and anxiety in addition to the role of positive regulation in other systems. Maybe through combination therapy we can effectively control diabetes and also improve cognitive function and overall quality of life.

Sachdeva et al. [13] found that researchers should consider cultural factors. Diabetes care requires cultural factors to provide better results. For prevention and care services, diabetes providers are expected to provide interventions that are in line with the patient's culture, this is also related to local eating habits. The way to eat or international diet cannot be applied in all regions unless it has a similar family structure in the Euro-American context. The choice of diet should be made more creative in adjusting to the culture of each region. Biomedical practitioners are expected to work hard to provide guidance related to the understanding and treatment of diabetes when there is a public health program for diabetes. Cultural characteristics such as values, beliefs, systems, habits, and family patterns can be used as a treatment plan that is culturally appropriate for diabetics. It aims to provide culturally appropriate interventions so that a range of innovative care models for diabetics is effective with multi-disciplinary teams. Culture-specific interventions that are in harmony with local contexts and needs tend to have a significant impact on diabetes care. However, such a model still needs to be tested and evaluated.

## V. CONCLUSIONS

Managing patients with diabetes mellitus by holistic care approach includes psychosocial, psychological support, lifestyle changes, health education, herbal food and medicine, culture, yoga, and technology. Indonesia has a diverse culture, each island or region has different habits in consuming herbs as food or medicine. In addition, the healthy outlook held by each region is also different. The differences in each region can be a barrier to the treatment of diabetes. This is highly considered by the authors for further research.

However, to improve the effectiveness of diabetes treatment programs that are needed to be integrated with culture, health and technology. Culture could be a barrier, but on the other hand, it must be utilized as supportive therapy for

diabetes. Technology helps reach the poor to get the proper care. In addition, technology provides a wider range, in this case, to areas that lack health facilities.

## CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

## ACKNOWLEDGMENT

The authors would like to extend their appreciation to the Faculty of Nursing Airlangga University.

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## APPENDIX

Table 2. Summary of selected articles

| Title / Author   | Type of DM   | Design                         | Sample | Variables  | Results   |
|--|--------------|--------------------------------|--------|--|---|
| Outcomes of holistic care for patients with type 1 diabetes (T1D) by multidisciplinary teams in Thailand Likitmaskul, et al. [8]   | T1DM         | Quasi-experiment               | 85     | self-monitoring of blood glucose (SMBG), HbA1C, blood sugar, eating disorders  | Diabetes self-management education and skills improved glycemic control.  |
| Evaluation of a holistic treatment and teaching program for patients with Type 1 diabetes who failed to achieve their therapeutic goals under intensified insulin therapy Bott, et al. [9]                             | T1DM         | Quasi-experiment               | 76     | HbA1C, blood sugar, eating disorders, knowledge, motivation, competence regarding diet, adaptation of insulin dosage | Treatment success was significantly associated with baseline HbA1c, stability of motivation, frequency of blood glucose self-monitoring, control beliefs and change in subsequent outpatient care.  |
| The Effectiveness of Holistic Diabetic Management between Siriraj Continuity of Care Clinic and Medical Out-Patient Department Chalerm Sri et al. [10]   | T2DM         | Retrospective chart analysis   | 757    | demographic data, glycemic control, screening for diabetic complications, and health maintenance.                    | The present study showed the continuity of care clinic got greater efficacy rather than with usual care at the medical OPD, that's aspect are screening, glycemic control, and prevention of diabetic complications.  |
| Technologies to Better Serve the Millions of Diabetic Patients: A Holistic, Interactive and Persuasive ICT Model to Facilitate Self Care, in Extremely Poor Rural Zones of Central America Vargas-Lombardo et al. [11] | T1DM<br>T2DM | A transversal analytical study | 107    | Patient acceptance   | This was shown with acceptance of the hiPAPD model by all the participants in the project. The model offers service that facilitates education, health, self-care and the social integration in a remote and marginal area.   |
| Holistic Impact of Closed-Loop Technology on People With Type 1 Diabetes Young et al. [12]   | T1DM         | Case study                     | 3      | Live experiences used during closed-loop technology for 1 month  | The first man experiences like "changing lives, a better version of myself". Feeling safe and comfortable using this tool. A 32-year-old female participant explained that this tool improves work performance, flexibility, and "the best control I have ever had". A 30-year-old man explained that this tool puts a burden on the mind. All the participants reported technological barriers and challenges such as system portability, frequent alarms, and poor device connectivity. |
| Cultural determinants: Addressing barriers to holistic diabetes care Sachdeva et al. [13]  | T2DM         | Qualitative study              | 25     | Cultural determinants in diabetes care   | Diabetes care requires cultural factors to provide better results. Prevention and care services, diabetes providers are expected to provide interventions that are in line with the patient's culture, this is also related to local eating habits.   |

|   |              |   |                                      |  |
|---|--------------|---|--------------------------------------|--|
| Living With Diabetes<br>Popoola [14]  | T2DM         | Qualitative study: 35 ethnography study | Holistic experiences                 | Their belief gives them spiritual strength for diabetes management because they all find a way to live a holistic life.  |
| Evidence-based herbal drug standardization approach in coping with challenges of holistic management of diabetes: a dreadful lifestyle disorder of the 21st century<br>Chawla et al. [15] | T1DM<br>T2DM | Literature review                       | Herbal drug                          | The lack of awareness causes diabetes that suddenly raises the risk of ketoacidosis and diabetic coma; if this is not handled properly it will lead to complex chronic diabetes. This multi-organ dysfunction syndrome that arises through this metabolic disorder can be reduced/postponed by using a holistic approach to herbal medicine. |
| Nutraceuticals as therapeutic agents for holistic treatment of diabetes<br>Baldi et al. [16]  | T1DM<br>T2DM | Literature review                       | Nutraceuticals as therapeutic agents | Nutraceutical agents to increase insulin sensitivity and glycemic control are $\alpha$ -lipoic acid, vitamins C and E, and magnesium.  |
| New vistas in treating diabetes - Insight into a holistic approach<br>Kutty and Raju [17]   | T2DM         | Commentary                              | Yoga, blood glucose                  | Blood glucose is effectively controlled when conventional treatment is carried out together with yoga therapy.   |

*T1DM: Type 1 Diabetes Mellitus; T2DM: Type 2 Diabetes Mellitus; QoL: Quality of Life; HbA1C / A1c: Glycemic Control; OPD: Out Patient Department; hiPAPD: Holistic, Interactive and Persuasive Model to Facilitate Self-care of the diabetic Patients*