Optimizing the Health of Type 2 Diabetes Mellitus Patients with Islamic Approaches and Volunteers

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ABSTRACT: This study aims to investigate the impact of an Islamic-based self-resignation exercise accompanied by natural volunteer assistance on the knowledge, control, self-management, and quality of life of Type 2 Diabetes Mellitus (T2DM) patients who also experience depression. The research method adopted a mixed methods design integrating quantitative experimental research with qualitative descriptive analysis. The findings showed that age and education had a significant effect on self-management, while income and T2DM duration had no partial effect on these aspects. The assistance of natural volunteers in Islamic-based self-surrender exercises positively strengthens the influence of patients' knowledge and self-management on T2DM control. The practical implications of these findings highlight that surrender exercises and the involvement of natural volunteers can be effective and culturally appropriate modalities to improve the knowledge, self-management behaviors, and quality of life of T2DM patients, especially for those who also experience depression. This study makes a valuable contribution to health practitioners and researchers interested in holistic approaches to chronic disease management.

Keywords: Type 2 Diabetes Mellitus (T2DM), depression, Islamic self-surrender, family volunteer.

I. INTRODUCTION

Two major issues affecting world health are depression and type 2 diabetes mellitus (T2DM) [1, 2]. Type 2 diabetes mellitus (T2DM), which is associated with both lifestyle choices and genetic factors, leads to the development of insulin resistance and elevated levels of glucose in the bloodstream [3, 4]. On the other hand, depression frequently coexists with long-term illnesses like type 2 diabetes, deteriorating quality of life and prognosis. Due of their negative effects on the economy and public health, both are the center of concern on a global scale. Non-communicable diseases, such as diabetes, accounted for 71% of all fatalities in 2016, making them the world's leading cause of death. The overarching goal is to reduce mortality rates caused by these illnesses by one-third by 2030 [5]. The IDF projects that the prevalence of diabetes in adults will reach 537 million by 2021 and likely rise to 783 million by 2045 [6-8]. As people age, the prevalence of diabetes increases; by 2045, we expect 24.7% of those in the 75–79 age range to have the disease [9-10]. We estimate that by 2045, Southeast Asia, currently ranked second, will have 151.5 million diabetics [11, 12]. Figur 1. provide a thorough analysis of each nation's diabetes prevalence for the period between 2021 and 2045 [10].

FIGURE 1. IDF Diabetes Atlas: Global Estimates of Undiagnosed Diabetes in Adults for 2021 [13, 14].

Chronic complications, financial burden, limited understanding of diabetes and inadequate management of glycemic lead diabetic patients who have been newly diagnosed to great life stress. The majority of them go through the standard grieving phases, which include denial, anger, despair, and the acceptance phase. Among those with type 2 diabetes, melancholy is a common and severe mental health problem. Depression among individuals with diabetes is linked to various factors, such as younger age, female gender, being unmarried, low socioeconomic status, poor glycemic control, lack of social support, lower education level, diabetic complications, physical limitations, medical conditions, and a history of depression [15, 16].

Engidaw et al. (2020) [16], T2DM patients have a 2-3 times higher chance of be depressed than the average person, with rates that range from thirteen percent to 40.4% in Ethiopia. Major depression approximately accounts for 12% of DM patients and milder degrees of depression were reported in 15-35% of patients [12]. In Indonesia, several people tend to neglect their health and often underestimate diabetes which causes high incidence of illness and death. The occurrence of diabetes increased in Indonesia because of a lack of public awareness in examining their health. Data showed that people with good knowledge of diabetes are correlated with better preprandial glucose levels [14].

Shown that those with T2DM at five health care facilities located in Karawang, West Java, possess a negative impression of the condition and a moderate level of knowledge about it [15]. Acquiring knowledge is crucial for T2DM patients to effectively manage their blood glucose levels, prevent problems, and enhance their standard of life [16]. A type of relaxation therapy used to treat both chronic & non-psychosomatic ailments is Islamic submission practice (SSP). The Islamic self- capitulate practice should be done by the patients two times daily with a duration of 20 minutes for 21 days sequentially. It consists of praying before breathing technique (inhale slowly through the nasal and mouth and the patients should close their eyes. Alongside this action is dhikr, which is an Islamic practice of remembering God. During this practice, the patients are imagining positive feelings and energy circulating through their bodies. Furthermore, the patients hold on to their breath for 15 seconds, with dhikr inside their mind, followed by exhalation through their mouth, and imagine all the suffering evaporating from their body therewith the breath. After all, the patients should do 1-2 regular breathing and reperform the method from the first step. [17] found that among those with T2DM without depression, there were substantial improvements in HOMA-IR, glycemic stages, or stress levels. The study [18] discovered that the practice of Islamic self-surrender resulted in a significant decrease in stress levels among individuals with Type 2 Diabetes Mellitus (T2DM).

Self-care activities in patients with T2DM are related to themselves and family members. It is included as an important factor in diabetes non-pharmacological management. By doing good self-care activities, there will be

decreased opportunities for chronic complications caused by T2DM. The study [19] revealed that community health volunteers might be essential to control glycemic among T2DM patients as they provide educational sessions, home visits, campaigns, broadcasting, and health food shops [20]. In a low-resource situation in Nepal, the glucose levels of T2DM patients who had a female public health volunteer also dropped [21]. Furthermore, relatives would play a more crucial part in the patients' ability to handle their own care. Educating family members would increase their support to these patients. There were no studies yet to investigate the impact of family member support on depression disorder in patients with T2DM. Thus, the purpose of this study is to assess type 2 diabetes patients' understanding of depression and their symptoms by combining Islamic submission with family help from volunteers.

The objective of this study is to enhance our comprehension of the determinants that impact the quality of life of individuals with type 2 diabetes mellitus (T2DM) who also experience symptoms of depression. Specifically, the study will focus on the influence of illness knowledge, self-management skills, and diabetes control. This study aims to assess the correlation among the three variables and their impact on the quality of life of patients. We anticipate that the findings of this study will aid in the development of more efficient interventions to enhance understanding, self-care, and regulation of DM, thereby enhancing the quality of life for patients. Furthermore, this study will offer empirical support for the advantages of naturally volunteer-guided surrender training, which may offer a novel intervention strategy for the treatment of type 2 diabetes. Therefore, we anticipate that this study will significantly enhance the quality of life for individuals with type 2 diabetes mellitus who experience symptoms of depression.

II. CRITICAL RIVIEW

1. HEALTH PROMOTION AND EMPOWERMENT

According to [22], empowerment is the process of granting individuals and communities the capacity and authority to make decisions. The process encompasses the identification of problems, the selection of solutions, and active involvement in the evaluation process [23]. According to [24], the goal of community engagement in health is to give people more control over their health. Health workers have the responsibility of facilitating, motivating, and evaluating community health initiatives [25]. Empowerment entails action, education, accessibility, and institutional growth [29]. The objective is to enhance community autonomy and engagement in endeavors to enhance health [26]. The ideas of empowerment encompass the notions of taking initiative, active engagement, and engaging in problem-solving [27]. It entails cooperation between the public, business, and community sectors and a people-centered approach [28]. The utilization of a systemic approach enables the comprehension of health issues and promotes effective communication among the concerned parties [29].

2. HEALTH PROMOTION MODEL

A model is a condensed depiction of an item or process used to comprehend a certain reality or hypothesis [30]. The primary objective of modeling is to accurately depict significant interactions within a system [31]. Health promotion refers to the systematic efforts aimed at enhancing a person's capacity to control and preserve their own psychological healthcare [32]. It encompasses alterations in social, environmental, and economic factors that impact one's health [33]. Health promotion aims to modify habits and enhance the skills and possibilities of individuals within community [33]. According to [34], the Naturally Volunteer System is a community support strategy that enlists natural volunteers to assist in health promotion activities. The strategy has six steps, ranging from garnering support to evaluating the program [35], with the objective of fostering health behavior modification through community involvement.

3. DIABETES MELLITUS TYPE 2

According to the 2021 Perkeni consensus, T2DM is a metabolic disease in which anomalies in insulin secretion or activity, influenced by both hereditary and environmental factors, result in elevated blood sugar levels. An unhealthy lifestyle, characterized by excessive calorie consumption and obesity, when combined with a genetic susceptibility, elevates the likelihood of acquiring diabetes with type 2 mellitus. Particularly, individuals of specific ethnicities, such as Asians, may have a higher susceptibility to diabetes when they have an elevated body weight index (BMI). Around

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90% of individuals with diabetes are obese, while a diet high in calories can also increase the risk, regardless of whether the person is initially obese or not [36]. Aside from genetic and lifestyle variables, environmental contaminants may potentially contribute to the onset of diabetes type 2 mellitus [37]. hepatic and muscular insulin resistance as well as pancreatic beta cell failure are pathophysiological factors of type 2 diabetes mellitus. Recent study indicates that beta cell failure manifests at an earlier stage and is more serious than previously believed. Furthermore, the brain, pancreatic alpha cells, the gastrointestinal tract, adipose tissue, and kidneys are among the organs that also have decreased glucose tolerance. These organs all have a role in the hyperglycemia that occurs in type 2 diabetes mellitus. [38], T2DM involves eight additional organs called "the egregious eleven" in addition to muscle, liver, and pancreatic beta cells.
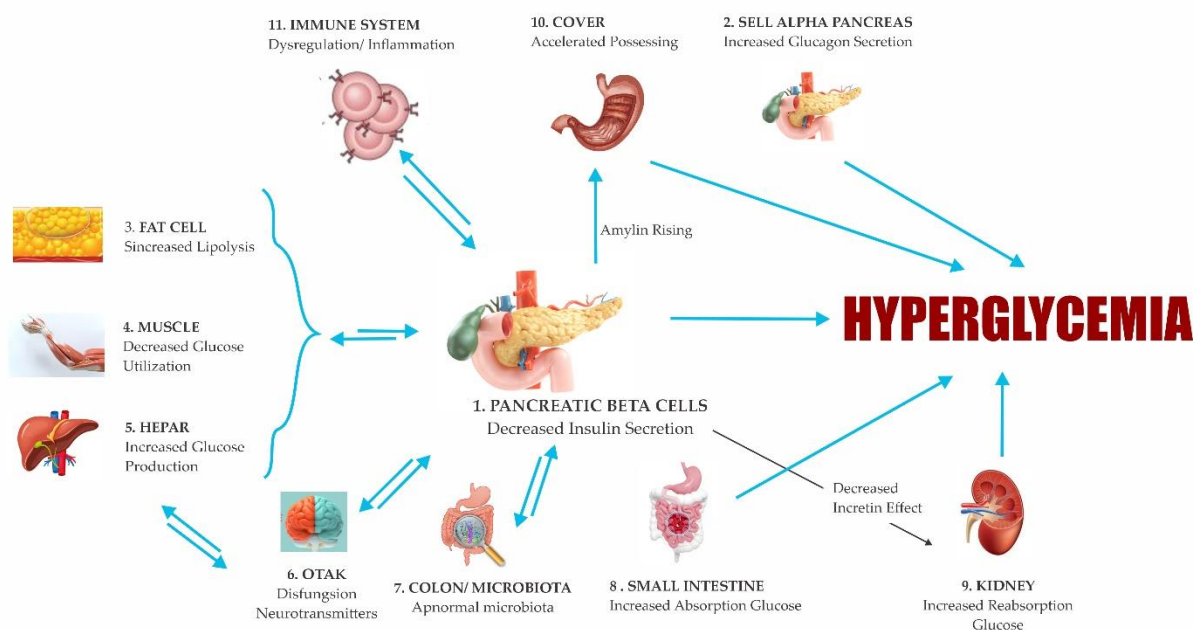

FIGURE 2. The Egregious Eleven, eleven things that play a role in the pathogenesis of hyperglycemia in type 2 diabetes mellitus [43-45].

The hallmark of T2DM is decreased function of the pancreatic beta and alpha cells, which causes the liver to synthesise more glucose. Furthermore, insulin resistance can occur in the liver, brain cells, muscles in the skeleton, and fat tissue. To address the numerous irregularities, treatment entails the use of medications such as metformin, sulfonylureas, and GLP-1 receptor agonists [39]. Thiazolidinediones or DPP-4 inhibitors are employed to diminish insulin resistance in adipocytes and the liver, whilst GLP-1 RA and amylin target malfunctioning in pancreas and brain alpha cells. Probiotics as well as prebiotics are used to control the population of microorganisms in the colon, whilst SGLT-2 inhibitors decrease the reabsorption of glucose in the kidney. Incretin hormones, namely GLP-1 and GIP, have an impact on how insulin reacts to glucose. This effect can be managed by using inhibitors of DPP-4 and acarbose. Furthermore, systemic inflammation contributes to the development of type 2 diabetes mellitus, and is linked to problems such as abnormal cholesterol levels and the formation of plaque in the arteries [41].

Age above 45, being overweight, relatives with low glucose tolerance, hypertension, dyslipidemia, history of gestational diabetes, and polycystic ovarian syndrome, which is linked to insulin resistance, are common indicators of risk for T2DM [46, 47]. The diagnosis of diabetes type 2 mellitus relies on analyzing blood sugar levels and HbA1c values [44]. Enzymatic venous blood plasma is suggested for blood glucose measurement, and a glucometer can be used for therapy monitoring [41]. Symptoms such as excessive urination, excessive thirst, excessive hunger, as well as weakness, tingling, itching, impaired vision, and sexual issues such as inability to achieve or maintain an erection in males and itching of the vulva in women may indicate the presence of type 2 diabetes. If the results of your HbA1c and blood glucose tests do not fit the normal or type 2 diabetes criteria, you may be diagnosed with prediabetes,

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which is the state in between normal and diabetes [44]. Oral glucose tolerance test (OGTT) technique detects IGT with plasma glucose levels of 140-199 mg/dL after two hours. IFG is identified with fasting glucose levels of 100-125 mg/dL. Prediabetes is indicated by HbA1c levels of 5.7%-6.4% [49, 50].

Table 1. Blood tests for diagnosing type 2 diabetes.

	HbA1c (%)	Fasting blood glucose (mg/dl)	Blood glucose 2 hours after TTGO (mg/dl)
Diabetes	≥6,5	≥126 mg/dl	≥200
Prediabetes	5,7 – 6,4	100 – 125	140 – 199
Normal	<5,7	70-99	70-139

Source Data: [51, 52]

Screening is essential to verify the diagnosis of T2DM and prediabetes in patients at high risk, particularly when there are no typical signs of T2DM. People in high-risk groups have a BMI of more than 23 kg/m2 with a few or all risk variables, such as low physical activity, a family history of diabetes, membership in specific racial groups, history of large baby delivery or pregnancy-related diabetes, hypertension, a low level of HDL and/or elevated triglycerides, polycystic ovary syndrome, a history of prediabetes, excessive weight gain, history with cardiovascular disease, or age greater than 45. Every three years for high-risk individuals with normal findings and once a year for prediabetic individuals is when blood glucose screening takes place. The primary objective of managing T2DM is to enhance the quality of life, minimize the likelihood of complications, and impede the advancement of the disease. Typical measures in basic health care involve assessing physical health and identifying any complications. If necessary, patients may be referred to secondary or tertiary facilities. Guidelines from [49], in order to identify and manage T2DM.

4. TYPE 2 DIABETES MELLITUS CONTROL BEHAVIOR

Breath and dhikr are the main subjects of Latihan Pasrah Diri (LPD), a mind-body relaxation method. The exercise is conducted twice daily, with each session lasting 20 minutes, for a minimum of 21 consecutive days. The technique was established at Gadjah Mada University in Yogyakarta as a means to address and alleviate symptoms of sadness and anxiety [20, 53].

In particular, when it comes to treating depressed symptoms in people with T2DM, natural volunteers offer helpful support. This intervention engages the patient's family in order to exert impact on the patient's behavior regarding their food, medicine, and physical activity [54, 55]. Systematic reviews indicate inconclusive findings on the impact of glycemic control. However, it has been suggested that the involvement of natural volunteers may have a positive effect on lowering depressed states [52]. Self-surrender training, which involves a combination of relaxation techniques and dhikr, is utilized as a treatment for depression in individuals with T2DM. However, the outcomes of this approach have not been consistently positive, as indicated by studies conducted by [47, 57, 58]. The impact could be attributed to the reduction of stress, which affects the hypothalamic-pituitary axis, leading to lower levels of cortisol and improved control of blood glucose levels [55]. The incorporation of family involvement and surrender exercises exhibits promise in the comprehensive treatment of T2DM accompanied by depressed symptoms.

The presence of depression in individuals diagnosed with T2DM has a detrimental impact on their overall quality of life. Receiving assistance from friends and family, known as social support, can enhance the overall well-being and help individuals with type T2DM better manage their condition [60-62]. Additional treatments, like as surrender exercises, can be beneficial in decreasing stress and depressed symptoms, as well as enhancing the overall well-being of individuals with T2DM [63, 64]. Despite some discrepancies in research findings, resignation training demonstrates promise in enhancing the level of living for those who have type 2 diabetes who also experience depression [56, 65-68].

5. FRAMEWORK OF THOUGHT

In individuals T2DM, variables like age, gender, income, and education have an impact on glycemic management. Glycemic management is typically better in older people, particularly when there is substantial family support. Poor glycemic control is more common in female patients with greater body mass indices. Improved glycemic management is linked to higher income and education levels. For patients with inadequate glycemic control, combination therapy involving insulin and oral antidiabetics is frequently employed. Long-term diabetes also affects glycemic control or depression levels, as can concomitant disorders like obesity, dyslipidemia, and hypertension [65]. Self-management practices can be changed, and depression symptoms can be lessened, with the use of self-resignation training and spontaneous volunteer help, particularly from relatives. An in-depth knowledge of diabetes is linked to enhanced control of glucose and a better standard of life, managing it well, and having low levels of depression [54, 60, 70–75].
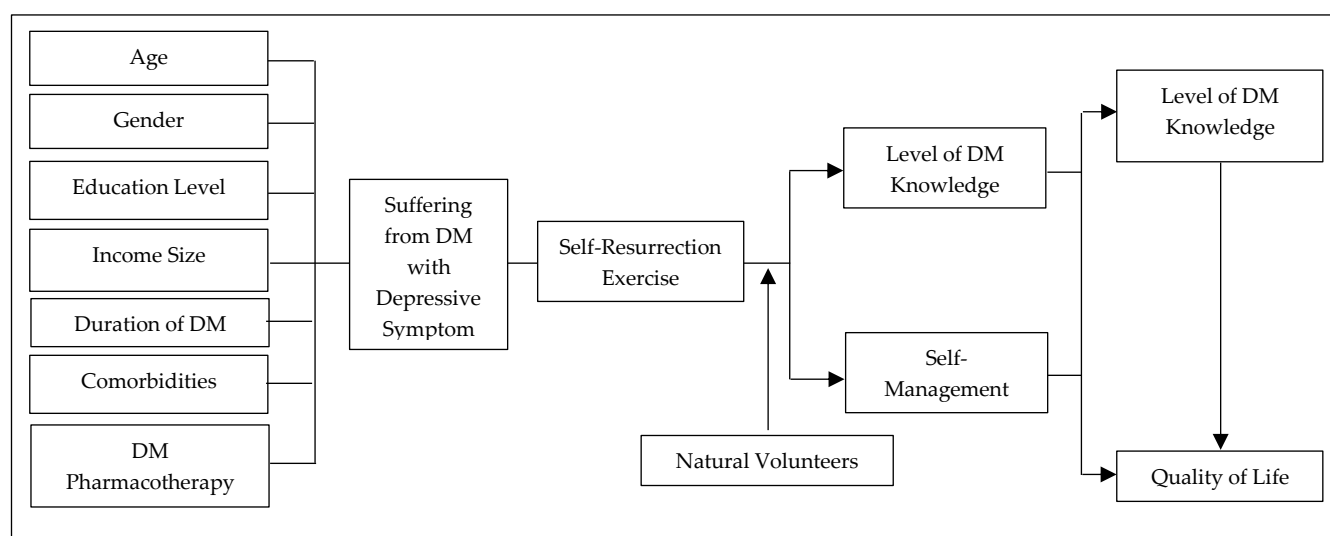

FIGURE 3. Research Model Framework

An overview of the study framework highlights several aspects that may impact the management of type 2 diabetes mellitus (DM), its effects on depression symptoms, and the quality of life of patients. Age plays an important role in the development of type 2 diabetes mellitus and depressive symptoms. Younger individuals exhibit suboptimal self-management habits and diminished self-efficacy while seeing themselves as being in good health. On the other hand, older patients have better blood sugar management when they receive more support from their families, particularly in larger families. This support enhances the patients' adherence to their diabetes mellitus treatment [66]. Furthermore, variables such as gender, level of education, and income also exert significant influence. Female patients, individuals with little educational attainment, and individuals with low income exhibit a higher likelihood of experiencing suboptimal control of their glucose levels and are susceptible to developing depression. Nonetheless, a high degree of education might shield type 2 DM patients from the prevalence of depression [57], [67]. The treatment obtained also has an impact on the management of type 2 diabetes mellitus. Research conducted by [69] indicates that patients who are prescribed a combination of oral antidiabetic medications and insulin are likely to have less effective control over their blood sugar levels.

This suggests that using multiple treatments simultaneously may be worth considering in order to improve disease management.There is a direct relationship between the length of time a person has had diabetes mellitus and their ability to control their blood sugar levels, as well as their likelihood of experiencing depression. Individuals who have additional medical disorders such as hypertension, dyslipidemia, and obesity are at an increased risk of experiencing issues and developing depression [60, 76, 77]. In order to enhance control over type 2 diabetes mellitus (DM) and decrease the likelihood of depression, it is crucial to adopt a mindset of acceptance, receive moral

encouragement from family members, and possess a high level of knowledge and self-management skills related to DM. These factors collectively contribute to an improved quality of life for patients [60, 76, 77]. By including these aspects in the study, the framework can provide a more thorough understanding of the factors that influence the control of type 2 DM, depressive symptoms, and patients' quality of life.

6. RESEARCH HYPOTHESIS

H1: Age, gender, education, income, duration of T2DM, comorbidities, and treatment can influence the knowledge of T2DM in patients with depressive symptoms.

H2: Age, gender, education, income, duration of T2DM, comorbidities, and treatment can impact the self-management of individuals with type 2 Diabetes Mellitus who also experience depressive symptoms.

H3: Age, gender, education, income, duration of T2DM, comorbidities, and treatment can all influence the control of type 2 diabetes mellitus in patients who also experience depressive symptoms.

H4: Age, gender, education, income, duration of T2DM, comorbidities, and treatment can impact the quality of life for individuals with type 2 diabetes mellitus who also have depressive symptoms.

H5: The involvement of volunteer support in surrender training enhances the impact of patients' knowledge on managing T2DM in individuals with depressive symptoms.

H6: Mengelola diri sendiri memiliki efek yang lebih kuat pada pengendalian DM pada pasien dengan T2DM yang memiliki gejala depresi ketika peserta alami membantu dalam pelatihan penyerahan diri.

H7: Volunteer support in surrender training bolsters the impact of patient knowledge on the quality of life for individuals with T2DM who also experience depressive symptoms.

H8: The assistance of natural volunteers in surrender training strengthens the influence of self-management on the quality of life of patients with T2DM depressive symptoms.

H9: Assistance of natural volunteers in surrender training strengthens the influence of T2DM control on the quality of life of patients with T2DM with depressive symptoms.

H10: Examining if type 2 diabetes knowledge level affects people's quality of life and how much control DM control has over it.

H11: Examining if the management of type 2 diabetes mellitus influences the impact of patient self-care on the patient's quality of life.

H12: Examine the impact of natural volunteers and relinquish training on the knowledge, self-management skills, and overall quality of life of individuals with type 2 diabetes.

III. MATERIAL AND METHOD

1. STUDY DESIGN

A hybrid method with a step-by-step explanatory strategic design was employed in this investigation . The initial phase entailed the gathering and examination of qualitative data, whereas the subsequent phase entailed quantitative data [78, 79]. Quantitative data was prioritized, while qualitative data gathering was guided by preliminary quantitative results through data blending. The experimental study comprised 120 outpatients with Type 2 Diabetes Mellitus (T2DM) at Batang Regional General Hospital. The inclusion criteria for the study were a Beck Depression Inventory (BDI) score greater than 17, a hemoglobin A1c (HbA1c) level higher than 7 mmol/l, and being of the Muslim faith. The exclusion criteria encompassed individuals who were unable to engage in Islamic surrender, those with disabilities, pregnant individuals, and those with severe illnesses. Support was provided by family volunteers. To further educate the public, in-depth interviews and group discussions were held. These methods provide a thorough understanding of the phenomenon being studied, thereby enhancing the accuracy and reliability of the findings.

2. RESEARCH VARIABLE MEASUREMENT

2.1 Variabel bebas (independent variable)

The intervention group was divided into two groups; the control group was type 2 DM patients with depressive symptoms who received medication and performed the surrender exercise without the assistance of natural

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volunteers, while the intervention group was DM patients with depressive symptoms who received pharmacotherapy who performed the surrender exercise accompanied by natural volunteers, through several research references [13, 80, 81].

2.2 *Dependent variable) Quality of life*

The assessment of individuals with Type 2 Diabetes Mellitus who are suffering from depression is underway.Assessing the quality of life, degree of knowledge, and behavior change related to self-management in patients with type 2 diabetes and depression is crucial for comprehending the influence of depression and evaluating the efficacy of therapies. Questionnaires or interviews can assess knowledge; daily logs, biometric assessments, or interviews can assess behavior change; and tools like WHOQOL-BREF and DQOL can assess quality of life. Studies indicate a direct correlation between quality of life (QoL) and knowledge, while depression might have an adverse effect on both. Behavior-modifying interventions such as diabetes education and depression treatment may enhance patients' quality of life [5].

2.3 *Variabel Moderator Natural volunteer*

People who naturally lend a hand to others in daily situations by sharing knowledge, skills, and emotional support are known as natural volunteers. When it comes to type 2 diabetes mellitus (DM), natural volunteers can offer emotional support, help with everyday duties, and knowledge about the disease. Assistance from these inherent volunteers aids in enhancing medication compliance, transitioning to a more health-conscious way of life, and effectively handling stress for those with type 2 diabetes mellitus. Surveys, interviews, or daily logs can all be used to measure natural volunteer variables in type 2 diabetes studies. The Multidimensional Scale of Perceived Social Support (MSPSS), the Interview Schedule for Social Support (ISS), and the Social Support Scale (SSS) are often used measuring tools. Through the utilization of these devices, researchers can gain a more thorough understanding and quantification of the influence that assistance from spontaneous volunteers has on those suffering from type 2 diabetes.

2.4 *Variabel Intervening Control of type 2 DM*

In order to better understand the factors influencing blood sugar levels and to enhance the quality of life for individuals with type 2 diabetes, measurement tools for intervening variables are important [78]. Factors like as dietary choices, level of physical activity, and mental well-being contribute to the attainment of ideal glycemic goals. The Dietary Inflammatory Index (DII) is used to determine the inflammatory properties of food. The Food Frequency Questionnaire (FFQ) is used to assess eating patterns [79]. The International Physical Activity Questionnaire (IPAQ) is used to measure levels of physical activity. The Depression Anxiety and Stress Scales (DASS) and Warwick Edinburgh Mental Well-being Scale (WEMWBS) are used to evaluate overall mental health [80]. These instruments offer a complete framework for doing research and implementing clinical practices aimed at controlling type 2 diabetes mellitus.

2.5 *Characteristics of respondents*

The features of participants in type 2 diabetic mellitus (DM) studies significantly influence research findings and their interpretation. Commonly assessed attributes encompass gender, age, educational attainment, income, received medical interventions, duration of diabetes mellitus, and coexisting medical conditions. We gather the required data using measurement tools like surveys, interviews, daily logs, and biometric assessments. Researchers can evaluate the respondents' effects on the management of type 2 diabetes and interpret the study's findings more comprehensively by having a thorough understanding of the respondents' characteristics.

Table 2. Operational Definition of Respondent Characteristics Variables

Variable	Concept Definitio	Measurement Tool	Measurement Method	Measurement Result	Scale
VariabelSubjek					
Age	Number of years from birth to last birthday	Questionnaire and subject status	Questionnaire Filling	1= < 40 Years 2= 41-50 Years 3= 51-60 Years 4= > 60 Years	Ordinal
Gender	Gender carried from birth in DM patients who are differentiated between male and female. male and female	Questionnaire and subject status	Questionnaire Filling	1 = Male 2 = Female	Nominal
Duration of Suffering Diabetes Mellitu	The last formal education successfully taken until graduation	Questionnaire and subject setatus	Questionnaire Filling	1 No School 2 Graduate Elementary School 3 Graduate Junior High School 4 Graduate High School/ Vocational School 5 Diploma / PT graduate	Ordinal
Revenue Size	The amount of family income per month based on the poverty line with a minimum standard family income approach (equal to the minimum wage)	Questionnaires and subject status	Questionnaire Filling	1=High: income ≥ Rp. 2,000,000,- 2=Low: income < Rp. 2,000,000,-	Ordinal
Duration of Suffering Diabetes Mellitus	Duration since initial diagnosis of diabetes mellitus	Questionnaire and subject status	Questionnaire Filling	1= <5 years 2= 5-10 years 3= >10 years	Ordinal
Pharmacotherapy Received	Control medication prescribed by an internal medicine specialist	Subject's status	Questionnaire Filling	1= Monotherapy 2= Oral antidiabetic combination 3= Combination of oral antidiabetics and insulin	Nominal
Komorbiditas	Chronic diseases accompanying diabetes mellitus	Questionnaire and subject status	Questionnaire Filling	1= Diabetes mellitus only 2= Diabetes mellitus with other comorbidities	Nominal

Source Data; [50, 82, 85-88]

This study, which cited many supporting studies, operationalized a number of variables that were measured or seen to comprehend the factors influencing the quality of life of type 2 DM patients with depressive symptoms. The study conducted measured age as the duration in years from birth to the time of the study [89, 90]. Gender was categorized as either male or female, as outlined in the paper. [87] the patient's income size was determined by taking their last formal schooling and adding it to their monthly income, which was calculated using the minimum wage. The medicine obtained was the prescribed medication from the doctor, and the length of type 2 DM was measured from the time of diagnosis, as outlined in the study conducted by [88]. Comorbidities encompassed the presence of additional chronic diseases, while depressive symptoms specifically referred to experiencing feelings of depression within the previous two weeks, as described [68]. Studies by [89] have confirmed the beneficial effects of the surrender exercise, which included twice-daily breathing relaxation and dhikr. The assessment of quality of life was

conducted over a period of four weeks, using eight different categories: physical functioning, energy levels, health distress, mental well-being, personal satisfaction, contentment with therapy, treatment effects, and frequency of symptoms. These categories were chosen based on the research conducted [58]. The assessment of type 2 diabetes mellitus (DM) management according to the Perkeni 2021 consensus. The extent of patients' understanding of type 2 DM, as described by [90] was used to gauge their degree of knowledge. [91], self-management behavior encompasses lifestyle choices linked to glucose control. Natural volunteers are those who assist patients with their self-management.

Batang Regional Hospital in Central Java, Indonesia, diagnosed type 2 diabetes using the formulas provided [92]. The calculation determined a minimum sample size of 120 individuals to account for potential dropouts. This sample size includes 60 individuals for the control group and 60 individuals for the intervention group. Following Permenkes 36/2012 on Medical Secrets, the qualitative study used a quota sampling method and had several steps, such as document analysis, deep interviews, focus discussion groups (FGDs), observation, and participation in an intervention group. The results of comprehensive interviews and focus group discussions will provide a profound understanding of the encounters of patients and volunteers in managing type 2 DM with symptoms of depression, as elucidated [93]. Participating in the surrender exercise and observing it will also offer firsthand knowledge of how it is carried out, supporting the overall qualitative results as stated by [96, 97].

3. STATISTICAL ANALYSIS

In research, measuring information is a critical phase when instrument reliability and validity are critical [96]. Validity, defined as the degree to which a measuring instrument accurately measures data, encompasses four primary aspects: content, face, construction, and criteria validity. Content validity assesses the extent to which the instrument covers relevant content and topics [97], whereas face validity assesses the instrument's exterior appearance and perception [97], [98]. Criteria validity establishes the instrument's predicting reliability, whereas construct accuracy shows how well-suited the instrument is to a specific construct [53]. Reliability refers to the degree of consistency and dependability of the measurement outcomes [101-103]. We assessed the study's dependability using the Cronbach's alpha coefficient [102], deeming an instrument dependable if its value was 0.6 or higher. The study employed both internal and external consistency methods, specifically the bisection and retest tests [103]. The ethical dimensions of research, including self-determination, privacy, beneficence, maleficence, and justice, are significant considerations [104]. Performing activities with the explicit agreement of the individuals involved requires the concept of informed consent. The data collection process included administrative and technical phases, and used simple random sampling to select the sample. In the implementation phase, the control group was under observation, and the intervention group underwent the intervention program [105]. Ensuring precision, consistency, and fairness throughout the whole study process guaranteed its integrity [106], [107].

Using a picture depicting every variable's distribution of frequency (n) and percentage (%) under examination, a univariate approach is utilized to characterize the properties of each research variable. This method seeks to offer a deeper comprehension of the data that has been observed [108, 109].

Bivariate analysis was employed to ascertain the correlation between the independent and dependent variables. Wilcoxon, Mann-Whitney, and paired t-test were among the statistical tests that were employed. The choice of these tests is determined by the research question and the type of data [110]. The Mann-Whitney test is employed when the data does not follow a normal distribution or when the sample size is small. On the other hand, the paired t-test is utilized to compare the means of two distinct groups [78]. Finding out whether there is a significant association between the two observed variables is the aim of this analysis [56, 82].

We used AMOS software to perform multivariate analysis using the Path Analysis model. A direct and indirect study of the cause-and-effect connection among variables is feasible using path analysis. The process involves specifying the model, identifying the model, testing hypotheses, assessing model fit, and maybe modifying the model if needed. The Chi Square Statistic (X2) test and the t test are two statistical test instruments used for hypothesis testing to assess the model's overall dependability (Ghozali, 2012). The Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) are some of the metrics used to assess model fit [111].

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The subject matter of the collected data and the research topics necessitated the selection of various statistical analysis techniques for this study. Mann-Whitney, Wilcoxon, and paired t-tests, for instance, were selected for bivariate analysis because of their effectiveness in handling data with small sample numbers or non-normal distributions [111]. This work selected route analysis as the method to represent the causal connections between the intricate variables [56, 82]. Data from the DKQ and BDI scores of each patient were collected and analyzed for comparing the pre- and post-intervention in both intervention and control group [82, 112]. Bivariate analysis was conducted in the present study using Mann-Whitney, Wilcoxon, and paired t-tests. Data were considered significant when the p-value was less than 0.05, while confidence intervals of 95% were used. The statistical software IBM SPSS was used to analyze the information Type. 23.

4. ETHICAL STATEMENT

Ethical clearance for the study was obtained from the Batang District Hospital Ethics Committee on July 4th, 2022 (Approval Number: 001/KEPK-RSUD-BTG/2022

IV.DATA ANALYSIS AND RESULT

1. QUANTITATIVE RESEARCH DATA ANALYS

There were 120 participants in the trial, split into groups for the control & treatment. The association between diabetes awareness, adherence to Islamic self-surrender, and depressed symptoms in patients with T2DM was investigated using bivariate analysis. The results of adherence to Islamic self-surrender practice in the control (78.17 ± 18.90) and intervention (86.72 ± 15.08) groups were significantly different (p=0.007).

Demographic data of these patients including gender, age, education, income, duration of DM, pharmacotherapy, and comorbidity were collected for this study (Table 3). Within the group that receives assistance, more than half of the subjects were female accounting for 35 participants (58.3%) with 25 male subjects (41.7%). According to age group, the majority of those who took part (43.3%) were between the ages of 51 and 60, next to those under 60 (30%), those aged 41 to 50 (23.3%), and those under 40 (3.33%). Most of the patients were only graduated from elementary school (36.7%). Sixteen participants (26.7%) graduated from junior high school, 20% from senior high school, and 16.7% of participants graduated from college. More than sixty percent of participants have lower than 2 million of their income.

Table 3. Total subjects and comparison of subject characteristics between control group and intervention group.

Characteristics		Control Group (60)		Intervention Group(60)	
		Total (n)	Percentage	Total (n)	Percentage
SEX	Male	24	40.0%	25	41.7%
	Female	36	60.0%	35	58.3%
AGE	<40 years	1	1.7%	2	3.3%
	41-50 years	9	15.0%	14	23.3%
	51-60 years	21	35.0%	26	43.3%
	>60 years	29	48.3%	18	30.0%
Education	"Elementary School"	16	26,70%	22	36.7%
	"Junior High School"	24	40,00%	16	26,70%
	"Senior High School"	11	18,30%	12	20,00%
	College	9	15,00%	10	16,70%
Income	<2 millions	41	68,30%	40	66,70%
	>2 millions	19	31,70%	20	33,30%
Duration of DM	<5 years	31	51,70%	44	73,30%

Characteristics		Control Group (60)		Intervention Group(60)	
		Total (n)	Percentage	Total (n)	Percentage
	5-10 years	25	41,70%	16	26,70%
	>10 years	4	6,70%	0	0,00%
Pharmacotherapy	Monotherapy	5	25,00%	13	21,70%
	Oral Antidiabetic Combinations	3	55,00%	24	56,70%
	Oral and Insulin Antidiabetic	2	20,00%	13	21,70%
Comorbidity	Yes	2	86,70%	47	78.3%
	No		13,30%	13	21,70%

Source of data; Processed by the author 2024

Duration of DM in those patients was predominantly by <5 years (73.3%) after 5-10 years duration (26.7%). Combination oral antidiabetic therapy was given to 56.7% of these patients, 21.7% with monotherapy, and the remaining 21.7% Insulin and oral medication were combined for the patients. The majority of individuals (78.3%) had comorbidities, while 21.7% did not. The treatment group comprising family volunteers had a higher commitment rate (p=0.007) to the surrendering oneself practice.

Table 4. Characteristics between control and intervention groups Chi-Square test and Fisher's exact test

Karakteristik Subjek		Nilai Persentase (%)		p
		Kelompok Kontrol	Kelompok Intervensi	
Gender	Laki-laki	24 (40,0%)	25 (41,7%)	1,000
	Perempuan	36 (60,0%)	35 (58,3%)	
Age	<40 years	4 (6,7%)	6 (10,0%)	0,358
	41-50 years	8 (13,3%)	13 (21,7%)	
	51-60 years	20 (33,3%)	26 (43,3%)	
	>60 years	28 (46,7%)	15 (25,0%)	
Education Level	S.D	16 (26,7%)	22 (36,7%)	0,741
	SMP	24 (40,0%)	16 (26,7%)	
	SMA/SMK	11 (18,3%)	12 (20,0%)	
	Diploma/PT	9 (15,0%)	10 (16,7%)	
Revenue Size	<2 Million	41 (68,3%)	40 (66,7%)	0,116
	>2 Million	19 (31,7%)	20 (33,3%)	
Duration of Type 2 DM	<5 Years	31 (51,7%)	44 (73,3%)	0,693
	5-10 Years	25 (41,7%)	16 (26,7%)	
	>10 Years	4 (6,7%)	0 (0,00%)	
Treatment Received	Monotherapy	15 (25,0%)	13 (21,7%)	0,221
	Oral Antidiabetic Combination	33 (55,0%)	34 (56,7%)	
	Oral and Insulin Combination	12 (20,0%)	13 (21,7%)	
Comorbidities	Available	52 (86,7%)	47 (78,3%)	0,673
	None	8 (13,3%)	13 (21,7%)	

Source of data; Processed by the author 2024

Table 4. displays data indicating that the distributions of gender, age, income, education level, length of type 2 diabetes, medication, and comorbidities were comparable in both groups. The study respondents' baseline characteristics did not show any discernible differences between both the intervention and control groups. For less than 5 years, the majority of participants received a diagnosis of type 2 diabetes mellitus, received prescriptions for

a combination of oral antidiabetic medications, and had additional medical concerns. This implies a homogeneous population of study participants, hence endorsing the suitability of cross-group data analysis.

Tabel 5. Distribution of depressive symptom variable respondents based on BDI score

No.	Score Interval	Category	Total	Percentage
1	17-20	Boundaries of clinical depression	2	1,7%
2	21-30	Moderate depression	88	73,3%
3	31-40	Severe depression	30	25,0%
	>40	Extreme depression	0	0,0%
Total			120	100%

Source of data; Processed by the author 2024

According to the Beck's Depression Inventory, people with type 2 diabetes who are receiving LPD have varying degrees of depression, as shown in Table 5. Previously, the study included all individuals who experienced depression. According to the data provided, a significant majority of patients diagnosed with type 2 DM exhibited symptoms of moderate depression, with a total of 88 individuals accounting for 73.3% of the sample. Out of the patients with Type 2 DM, 30 individuals (25.0%) had severe depression, 2 individuals (1.7%) had borderline clinical depression, and none had extreme depression. This emphasizes the importance of conducting depression screenings on people diagnosed with type 2 diabetes mellitus. It is predicted that 12% of patients with DM may experience significant depression and that 15% to 35% of patients may experience mild-to-moderate depression. The reference is [113] A different study looked at 314 people with diabetes and found that 29.1% of them had at least mild depression, 38.7% had moderate depression, 17.2% had moderate-severe depression, and 3.1% had major depression. The management of most patients suffering from severe depression was inadequate.

Table 6. Distribution of respondents variable level of knowledge of type 2 DM

Score Interval	Category	Total	Percentage
17-24	High	15	12,5%
9-16	Fair	26	21,7%
0-8	Low	79	65,8%
Total		120	100%

Source of data; Processed by the author 2024

79 people, or 65.8% of the study's respondents, had a low understanding of type 2 diabetes (DM), according to the Diabetes Understanding Questionnaire (DKQ). Out of the total responses, 26 individuals possessed a moderate degree of knowledge regarding DM, accounting for 21.7% of the sample. Additionally, 15 participants demonstrated a high level of knowledge about type 2 DM, representing 12.5% of the sample. Most study participants have a poor level of education, which may contribute to their limited understanding of type 2 DM. There is a strong association between the level of knowledge about type 2 diabetes mellitus (DM), HbA1C levels, and self-care actions in patients with type 2 DM [114].

Table 7. Distribution of respondents variable level of self-management of type 2 DM based on each subscale of the DSMQ.

Dimensions	Score	Category	Total	Percentage
Glucose management	>6	Adequate	23	19,17%
	≤6	Inadequate	97	80,83%
		Total	120	100%

Dimensions	Score	Category	Total	Percentage
Dietary control	>6	Adequate	17	14,17%
	≤6	Inadequate	103	85,83%
		Total	120	100%
Physical activity	>6	Adequate	16	13,33%
	≤6	Inadequate	104	86,67%
		Total	120	100%
Health care	>6	Adequate	15	12,5%
	≤6	Inadequate	105	87,5%
		Total	120	100%
Overall self-management	>6	Adequate	23	19,17%
	≤6	Inadequate	97	80,83%
		Total	120	100%

Source of data; Processed by the author 2024

The majority of type 2 DM patients in this study had unsatisfactory self-management in the five DSMQ aspects, according to the data in Tables 7 and 8. The majority of the participants had insufficient glycemic management, dietary habits, and physical activity, along with suboptimal utilization of healthcare resources. However, in general, the majority of respondents regarded their self-management as satisfactory. The possible causes of this issue could be attributed to an insufficient understanding of type 2 DM, misconceptions, a lack of motivation, and familial assistance. These findings emphasize the significance of improved education and assistance in the self-management of patients with DM to enhance awareness and self-care skills beyond medication.

Table 8. Distribution of respondents of self-management variables of type 2 DM patients based on the overall score of the DSMQ.

Score Interval	Category	Total	Percentage
32-48	Good	1	0,83%
16-31	Fair	111	92,5%
0-15	Bad	8	6,67%
Total		120	100%

Source of data; Processed by the author 2024

When it came to surrender training (LPD), patients with type 2 diabetes (88 individuals; 72.7%) exhibited a generally good degree of compliance. Meanwhile, 21 individuals exhibited a moderate level of compliance, and up to 12 individuals showed a low level of compliance, accounting for 9.9% of the total. Table 8. below provides information on individuals with type 2 diabetes who are receiving LPD in relation to their compliance level. LPD, which pertains to everyday worship, familiarizes patients with it, facilitating their integration into their daily routines.

Table 9. Distribution of respondents on the variable of compliance with surrender training.

Score Interval	Category	Total	Percentage
76-100	Good	88	72,7%
60-75	Fair	21	17,4%
<60	Less	12	9,9%
Total		120	100%

Source of data; Processed by the author 2024

With the help of surrender training, type 2 diabetes patients with depressive symptoms had their quality of life evaluated using the eight-dimensional Diabetes Quality of Life Clinical Trial Questionnaire (DQLCTQ). The findings presented in Table 9. indicated that most patients with DM had a substandard quality of life across multiple domains, including physical functioning, energy levels, and health distress. While most individuals expressed contentment with their treatment, a significant number reported a frequent occurrence of symptoms related to diabetes mellitus.

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In general, the quality of life scores were lower compared to prior research, potentially because all patients showed symptoms of depression. Prior studies have demonstrated a substantial inverse correlation between depression and the overall well-being of individuals diagnosed with type 2 diabetes mellitus. To improve the quality of life for patients with type 2 diabetes mellitus who exhibit depressed symptoms, these findings highlight the significance of providing comprehensive therapy for psychological issues and mental health.

Table 10. Compliance rate of surrender training Mann-Whitney test

Variabel	Mean Value ± Standard Deviation		p
	Control Group	Intervention Group	
Resignation Training Compliance	78,17 ± 18,90	86,72 ± 15,08	0,007[a*]

Source of data; Processed by the author 2024

Table 10. compares how well the two groups adhered to the surrender training. The intervention group's surrender training compliance significantly differed from the control group (p = 0.007). In the intervention group, the compliance rate with surrender training was 86.72 ± 15.08%, while in the control group, it was 78.17 ± 18.90%.

Table 11. Depression level, DM knowledge level, DM self-management level, and quality of life before and after treatment, Metode Uji T & Uji Wilcoxon.

Variables	Group	N	Mean ± Standard Deviation		p
			Pre	Post	
BDI total score	Control	60	19,80 ± 2,81	17,98 ± 4,39	0,004[b*]
	Intervensi	60	19,48 ± 2,86	14,38 ± 4,27	<0,001[b*]
DKQ total score	Control	60	13,27 ± 5,90	14,75 ± 6,07	0,021[b*]
	Intervensi	60	6,50 ± 2,00	17,72 ± 4,79	<0,01[b*]
DSMQ total score	Control	60	26,30 ± 4,16	23,10 ± 2,62	<0,01[b*]
	Intervensi	60	25,90 ± 3,38	25,95 ± 2,59	0,927[a]
DQLCTQ total score	Control	60	45,86 ± 4,09	45,20 ± 3,68	0,383[a]
	Intervensi	60	45,23 ± 3,81	46,56 ± 4,10	0,131[b]

Source of data; Processed by the author 2024

Table 11. presents the test findings for the quality of life, self-management, depression, and type 2 diabetes knowledge levels. At the level of depression, there was a significant and measurable reduction in BDI scores (p<0.01) in both groups. The intervention group exhibited a more significant enhancement in their BDI score compared to the control group, with a decrease from 19.48 ± 2.86 to 14.38 ± 4.27 following the intervention. The BDI score decreased in the control group, going from 19.80 ± 2.81 percent to 17.98 ± 4.39. Both groups' levels of type 2 diabetes knowledge increased: for the intervention group, it went from 6.50 ± 2.00 to 17.72 ± 4.79 (p<0.01), and for the control group, it went from 13.27 ± 5.90 to 14.75 ± 6.07 (p = 0.021). The intervention group had a more substantial enhancement in DKQ score compared to the control group. In neither group did self-management variables show a statistically significant improvement. The mean score in the intervention group changed from 25.90 ± 3.38 to 25.95 ± 2.59 (p = 0.927). DQLCTQ scores increased in the intervention group on quality of life measures from 45.23 ± 3.81 to 46.56 ± 4.10, although the difference was not of statistical significance (p = 0.131).

Table 12. Results of analysis of type 2 DM control parameter variables, T test and Wilcoxon test

Variabel	Group	N	Mean ± Standard Deviation		p
			Pre	Post	
Fasting Blood Sugar	Control	60	188,85 ± 82,98	170,56 ± 67,61	0,045[b*]

	Intervention	60	191,38 ± 78,04	157,91 ± 64,16	<0,01b*
2 Hour Post Prandial Blood Sugar	Control	60	244,72 ± 99,21	225,81 ± 83,08	0,114a
	Intervention	60	252,91 ± 83,06	202,96 ± 86,60	<0,01b*
HbA1C	Control	60	8,91 ± 2,55	9,25 ± 2,29	0,104a
	Intervention	60	9,66 ± 2,50	8,28 ± 2,62	<0,01b*
Cholesterol	Control	60	231,95 ± 183,86	208,46 ± 61,40	0,274b
	Intervention	60	201,23 ± 52,48	202,46 ± 50,27	0,784a
LDL	Control	60	128,76 ± 43,17	123,86 ± 45,76	0,293a
	Intervention	60	126,02 ± 75,02	114,82 ± 39,77	0,013b*
HDL	Control	60	49,90 ± 11,59	49,15 ± 11,07	0,443b
	Intervention	60	45,41 ± 10,55	46,17 ± 18,12	0,747a
Triglyceride	Control	60	208,18 ± 98,25	191,36 ± 86,63	0,130a
	Intervention	60	220,70 ± 183,82	185,58 ± 107,26	0,002b*
Systolic Blood Pressure	Control	60	145,38 ± 22,25	136,37 ± 17,93	0,285a
	Intervention	60	136,22 ± 25,78	134,70 ± 19,58	<0,01a*
Diastolic Blood Pressure	Control	60	77,62 ± 11,02	76,75 ± 10,67	0,883a
	Intervention	60	77,70 ± 13,30	77,62 ± 11,29	0,829a
Body Mass Index	Control	60	23,43 ± 2,01	24,63 ± 8,06	0,031b*
	Intervention	60	23,90 ± 2,00	23,80 ± 1,89	0,096b

Source of data; Processed by the author, AMOS 2024

The outcomes of the test measuring the control parameter for diabetes are presented in Table 12. The intervention group showed a statistically significant reduction in systolic blood pressure (p<0.01), decreasing from an average of 136.22 ± 25.78 to 134.70 ± 19.58. The BMI also improved, from 23.90 ± 2.00 to 23.80 ± 1.89, although it was not significantly different (p = 0.096). The fasting blood sugar level shown a substantial reduction (p<0.01) from 191.38 ± 78.04 to 157.91 ± 64.16, indicating a more pronounced improvement in comparison to the control group. The blood glucose level after eating, measured at 2 hours, significantly decreased (p<0.01) from 252.91 ± 83.06 to 202.96 ± 86.60, with a larger decline compared to the control group. The HbA1c level shown a substantial drop (p<0.01) from an initial value of 9.66 ± 2.50 to a final value of 8.28 ± 2.62. The intervention group's lipid profile only demonstrated significant improvement in LDL and triglycerides. LDL decreased from 126.02 ± 75.02 to 114.82 ± 39.77 (p = 0.013), and triglycerides decreased from 220.70 ± 183.82 to 185.58 ± 107.26 (p = 0.002).
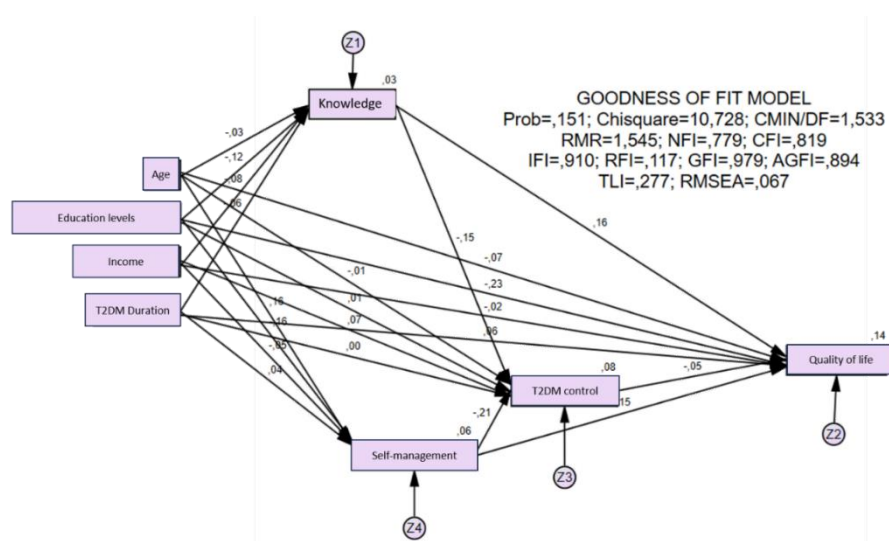

FIGURE 3. Test Results of the Effect of Patient Characteristics on Knowledge, Self-management, Control of Type 2 DM and Patient Quality of Life

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Table 13. Test Results of the Effect of Patient Characteristics on Knowledge, Self-management, Control of Type 2 DM and Patient Quality of Life For AMOS 2024.

Data Description	Estimate (B)	SE	C.R.	P
Knowledge Level <--				
age	-0.167	0.454	-0.367	0.714
education level	-0.609	0.454	-1.342	0.179
income size	-0.842	0.958	-0.879	0.379
duration of DM	-0.664	0.983	-0.676	0.499
Self-Management <--				
age	1.370	0.748	1.832	0.067
education level	-1.343	0.747	-1.799	0.072
income size	-0.821	1.577	-0.520	0.603
length of time suffering from type 2 DM	0.707	1.618	0.437	0.662
Type 2 DM control <--				
age	-0.030	0.198	-0.151	0.880
education level	0.028	0.198	0.140	0.889
income size	0.330	0.412	0.801	0.423
length of time suffering from type 2 DM	-0.012	0.423	-0.029	0.977
knowledge	-0.066	0.040	-1.674	0.094
self-management	-0.055	0.024	-2.275	0.023
Quality of Life <--				
age	-2.187	2.661	-0.822	0.411
education level	-6.867	2.667	-2.575	0.010
income size	-1.313	5.562	-0.236	0.813
length of time suffering from type 2 DM	4.212	5.686	0.741	0.459
Level of knowledge	0.562	0.330	1.700	0.089
type 2 DM control	0.954	0.538	1.772	0.076

Source of data; Processed by the author, AMOS 2024

The study's findings suggest that patient understanding of type 2 DM disease is unaffected in any way by factors such as age, income, education, or duration of disease. Age, education level, income, and the length of type 2 DM do not all have a partial impact on type 2 DM control, but they do have an impact on self-management through age and education. Patients' quality of life is positively impacted by education (at a 5% level), but not by age, income, or the length of their type 2 diabetes. Only education level along with age, income, duration of diabetes mellitus, and other characteristic factors has an impact on patients' quality of life. For this reason, education level will be used as a control variable in the main model to evaluate the impact of patients' knowledge level and self-management on their quality of life by regulating type 2 diabetes mellitus.

Tabel 14. test of surrender training and its effect on type 2 DM control and quality of life in type 2 DM patients with depressive symptoms.

Control Group			Estimate	S.E.	C.R.	P
Type 2 DM control	<---	Knowledge Level	-0.018	0.053	-0.344	0.731
Control_DM type 2	<---	Self-management	-0.015	0.036	-0.401	0.689
Quality of life	<---	Self-Management	0.250	0.395	0.633	0.527
Quality of life	<---	Type 2 DM Control	0.886	1.511	0.587	0.557
Quality of life	<---	Knowledge Level	0.708	0.579	1.222	0.222
Quality of life	<---	Education level	-0.534	3.197	-0.167	0.867

Source of data; Processed by the author, AMOS 2024

Table 15. shows natural volunteer assistance during surrender training enhances patient knowledge, self-management, and diabetes control, improving quality of life.

Intervention Group			Estimate	S.E.	C.R.	P
Type 2 DM Control	<---	Knowledge Level	-0.139	0.059	-2.378	0.017
Control_DM Type 2	<---	Self-management	-0.106	0.031	-3.392	***
Quality_Life	<---	Self-Management	-0.721	0.567	-1.271	0.204
Quality_Life	<---	Type 2 DM Control	-5.467	2.348	-2.328	0.020
Quality of life	<---	Knowledge Level	-0.770	1.003	-0.768	0.443
Quality_Life	<---	Education level	-8.159	3.922	-2.080	0.038

Source of data; Processed by the author, AMOS 2024

Table 16. Comparison of Control and Intervention Group Path Analysis Results

Direct Effect		Control Group			Intervention Group		
DM Control		ϱ	CR	P	ϱ	CR	P
←	Knowledge	-0,047	-0,344	0,731	-0,295	-2,378	0,017
←	Self-Management	-0,055	-0,401	0,689	-0,421	-3,392	***
Quality of Life							
←	Self-Management	0,086	0,633	0,527	-0,188	-1,271	0,204
←	HR Control	0,080	0,587	0,557	-0,359	-2,328	0,020
←	Knowledge	0,165	1,222	0,222	-0,107	-0,768	0,443
←	education level	-0,023	-0,167	0,867	-0,276	-2,080	0,038

Source of data; Processed by the author, AMOS 2024

The results of this study showed that patients with type 2 diabetes who receive assistance from natural volunteers in their resignation training have better type 2 diabetes control than patients who have high knowledge but do not receive such assistance. This suggests that when natural volunteers assist patients with their resignation training, it strengthens the influence of patient understanding on type 2 diabetes control. The involvement of spontaneous volunteers in surrender training for patients with type 2 DM enhances the impact of patient self-management on type 2 DM regulation. In comparison to patients who manage their diabetes well but do not receive support from natural volunteers during surrender training, those who manage their diabetes well and participate in surrender training with the help of natural volunteers typically have superior control over their type 2 diabetes. Nevertheless, the findings of this study indicated that the involvement of unpaid individuals with inherent qualities in the process of training patients with type 2 DM to give up certain habits did not enhance the impact of their understanding on their overall well-being. Patients with diabetes type 2 mellitus benefit from natural volunteers' support in surrender training, which increases the impact of patient self-management on their quality of life. Patients who possess effective self-management skills and receive surrender training with the aid of natural volunteers generally experience a higher quality of life compared to patients who possess effective self-management skills but undergo surrender education without the support of natural volunteers. The involvement of spontaneous participants in the surrender process of type 2 DM patients enhances the impact of type 2 DM management on the patients' standard of living. Patients who have effective type 2 diabetes management and who receive aid from natural volunteers during surrender training report a higher quality of life than those who have good type 2 diabetes management but who do not receive such assistance.

Table 17. Mediating effect of DM control on quality of life of DM patients

Indirect Effect	ta	tb	*p*-value
Knowledge - Control of type 2 DM - Quality of Life	-2.378	-2.328	0.048
Self-management - Control of type 2 DM - Quality of Life	-3.392	-2.328	0.027

Source of data; Processed by the author, AMOS 2024

The study showed that type 2 DM control plays a significant role in mediating the effect of knowledge and self-management on patients' quality of life. In both cases, type 2 DM control has full mediation properties, which means that knowledge and self-management do not directly affect quality of life. However, when mediated by type 2 DM control, patients with good knowledge and self-management can achieve a better quality of life. This is indicated by the significant results, with $p = 0.048$ for knowledge and $p = 0.027$ for self-management.

2. QUALITATIVE RESEARCH DATA ANALYSIS

We reviewed the medical documentation of individuals with type 2 diabetes. The data shown in the table indicates that there is no correlation between gender and the occurrence of type 2 DM with depression symptoms. Both men and women have an equal likelihood of experiencing it. Nevertheless, factors such as age, level of education, income, length of type 2 diabetes mellitus, and drugs used have an impact on the occurrence of type 2 diabetes mellitus accompanied by depressive symptoms. The prevalence of type 2 diabetes mellitus (DM) rises as individuals grow older, primarily as a result of diminished pancreatic function and decreased insulin output. Individuals with a higher level of education are more likely to refrain from engaging in unhealthy behaviors, possess the knowledge and understanding to frequently monitor their health, and effectively take care of themselves. Individuals with little financial resources frequently encounter challenges in obtaining nutritious meals, accessing healthcare facilities, and acquiring necessary medications, hence heightening their susceptibility to depression. Conversely, those with higher wages have greater freedom to consume foods that have a higher likelihood of contributing to the development of type 2 diabetes mellitus. The duration of type 2 diabetes mellitus (DM) also impacts the occurrence of depression. As time passes, pancreatic function deteriorates and insulin resistance intensifies, resulting in inadequate control of blood sugar levels and the development of degenerative conditions, including hypertension. As individuals with type 2 diabetes mellitus grow older, the likelihood of experiencing complications also tends to rise. Furthermore, the duration of type 2 DM directly correlates with the duration of medication usage, such as insulin, which contributes to the psychological strain and heightens the likelihood of experiencing depression.

In type 2 DM patients with depressive symptoms, pharmacotherapy, surrender training, and natural volunteer interventions improved type 2 DM control parameters such as body mass index, blood sugar levels (fasting blood sugar and 2-hour postprandial blood sugar), HbA1c, and lipid levels (total cholesterol, LDL, HDL, and triglycerides). Apart from its direct impact on blood sugar, body weight, and lipid profiles, medication also incites a relaxation response that has the potential to reduce stress hormones such as catecholamines and cytokines that are pro-inflammatory, hence promoting improved insulin resistance. The practices of surrender and natural volunteering may indirectly improve type 2 diabetes control metrics through increased patient awareness and self-management, as well as increased compliance with both pharmaceutical and non-pharmacological therapy.

Through extensive interviews and focus group discussions, it was discovered that patients with type 2 diabetes mellitus (DM) and depressive symptoms who received surrender training facilitated by natural volunteers expressed the highest level of confidence and closeness towards nuclear family members assigned as natural volunteers. Due to their prolonged cohabitation, patients perceive family members as having the most comprehensive understanding of their requirements, unlike cadres, health workers, or peer groups. Patients with Type 2 DM frequently encounter difficulties adhering to treatment regimens due to the need to consistently take many medications. Natural volunteers assist with the dietary and exercise adjustments required to maintain glucose control, in addition to helping with prescription preparation and reminders. Their assistance includes meal preparation and monitoring the patient's physical activity, although following these instructions still requires the patient's involvement. For individuals with type 2 diabetes, frequent visits to medical facilities might be difficult because they may be unwilling, forgetful, unable to follow instructions, or incapable of going alone. Spontaneous volunteers help overcome these obstacles, facilitating patients' ability to reach health professionals. Spontaneous participants also have a significant impact on surrender exercises, which can be a challenge for patients to recall. They provide inspiration, reminders, and support to patients during exercise, which stimulates the relaxation response and enhances patients' spiritual connection to God through dhikr, ultimately enhancing patients' motivation and overall quality of life, particularly in psychological aspects. Effective communication, along with the existence of natural volunteers, is critical.

Volunteers with innate abilities must possess the skills to effectively communicate information and motivation to patients with type 2 DM and depressive symptoms. This is crucial in order to positively impact their treatment, dietary habits, physical activity, healthcare visits, and adherence to exercise routines.

The study observed participants who voluntarily accompanied type 2 DM patients with depressive symptoms during surrender training. The findings revealed that these individuals played a significant role in facilitating patient self-management. Self-management of Type 2 DM treatment requires external assistance from unpaid individuals who willingly offer their support. Effective communication is critical in determining the impact of spontaneous volunteers on patients. They must possess the ability to communicate messages with a combination of sensitivity and assertiveness, employ straightforward language, and actively aid patients in duties such as medicine and food preparation, as well as scheduling doctor appointments. Despite the challenges, those who have innate volunteering qualities achieve success by employing effective communication patterns. They persevered in persuading hesitant patients to adhere to the advice and effectively convinced them to take the required measures. Furthermore, natural volunteers successfully surmounted practical obstacles, such as the inability to accompany patients to routine check-ups, by collaborating with other individuals or organizations that were able to provide assistance. This illustrates that unprompted volunteers not only provide verbal encouragement but also actively participate in addressing the practical aspects of patients' self-care. As a result, this discovery validates the important role of spontaneous volunteers in helping patients with type 2 diabetes mellitus and depressive symptoms achieve effective self-management.

V. DISCUSSION

It has been known that the influence of religiosity is one of the critical ways to maintain health and well-being. Among Javanese, involvement in Islamic values and practices were evident in their daily life. Permana (2015) revealed a strong connection between religious beliefs and cultural values among Muslim Javanese. [95], religious engagement and emotional support from family have a big impact on the participant's knowledge and abilities in diabetes treatment. Islamic self-surrender practice contains several activities such as breathing techniques, guided imagery, and recurrent prayers which objectively manage non-psychotic depression and anxiety in chronic illness patients [17]. This technique was expected to have a beneficial effect on depression in diabetic patients along with a combination of standard therapy [115]. A study by Wicaturatmashudi et al. presented a good influence of Islamic self-surrender practice to stress in patients with T2DM [18]. Combined with volunteer support, our study corroborated the previous result with a greater reduction of BDI score after the intervention compared with the control group. Volunteers provide empathy, understanding, and individual support to each patient. Therefore, their existence will help each person with diabetes to have good compliance with diabetic management and self-care to prevent depression in those patients [116].

Shirinzadeh et al. (2019), found that community-based programs that include education on lifestyle, preventive, and self-monitoring substantially enhanced lifestyle choices and decreased the prevalence of diabetes. Family volunteers can contribute to improving diabetes awareness, and patient comprehension and compliance with long-term therapy are critical. Wichit et al. (2016), Spencer et al. (2018), Islamic submission exercises with family volunteers resulted in higher DKQ ratings in the treatment groups compared to controls, indicating enhanced patient understanding after a period of 18 months of intervention.

According to the current study, there is no distinction between males and girls in terms of the occurrence of DM with depressive symptoms. The relationship between age and the occurrence of DM with depressive symptoms still yields different conclusions in various studies. Males and girls did not significantly differ in the incidence of depression-related symptoms in major depressive disorder (DM), according to an Indian study [120]. Women, regardless of diabetes, are more likely to show signs of depression, according to several studies [121], [122]. A systematic review showed a one-third higher risk of depression in women with diabetes than in men [121]. Studies indicate that gender is associated with the occurrence of diabetes with depressive symptoms, but many factors influence it [122].

Our study result presented that the occurrence of DM with depressive symptoms tends to increase with age. Studies have demonstrated that older persons are more likely than young people or older individuals to have

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depression symptoms associated with diabetes mellitus (DM). found that among individuals with diabetes in their 40s, the incidence of being depressed was two times higher than that of people without diabetes [123]. Based on a cohort study, the Between 45 and 54 age group had the greatest prevalence of the disease with depressed symptoms for males and the age group of 55-64 years. These findings are due to the increased risk of death from other causes in elderly patients and the difficulty in detecting depression in old age, resulting in a lower prevalence of DM with symptoms in the elderly compared to younger age groups [124].

Several studies show that a lower incidence of depression symptoms in DM is associated with higher levels of education. Because more educated people tend to visit healthcare facilities more frequently, education may be an inhibitor for depressed symptoms in people with diabetes mellitus. Higher education also reduces unhealthy behaviors such as smoking and obesity [125]. Another study also revealed that higher education levels are associated with better self-care, which can help reduce the occurrence of depression in DM patients [126].

The current study found that a higher income is correlated with a higher incidence of depression symptoms in people with diabetes mellitus. The access of higher-income individuals to various types of food makes them more vulnerable to unhealthy eating patterns. This finding differs from previous research. One study revealed that DM patients with low-income experience food vulnerability. There is an increase in the consumption of unhealthy foods, such as calorie-dense and high-sugar foods. This condition leads to worse glycemic control, increasing the risk of depressive symptoms in DM patients [127].

It is also found that the duration of having DM and receiving more frequent and longer treatments are associated with a higher occurrence of depressive symptoms in DM patients. Among elderly men, there exists a non-linear, The length of time after diagnosis of diabetes & the chance of getting melancholy have a "J-shaped" association [86]. However, a study in Bangladesh exhibited a result of early onset (<40 years old) of T2DM patients increasing 57% possibility of melancholy in comparison to typical T2DM onset (≥40 years) [128]. Longer duration of diabetic treatment is associated with the incidence of depression in T2DM patients [129].

Insulin usage and polypharmacy are specifically linked to prolonged diabetes duration. . Chen et al. (2013) found that the incidence of feeling depressed has tripled in patients on oral antidiabetic treatment. The multitude of therapies received can lead to a negative perspective on the disease, resulting in the onset of depressive symptoms. Furthermore, vulnerability, characterized by reduced physical ability, easy fatigue, and weight loss in elderly individuals who have had diabetes for a long time, also becomes a factor in the development of depression [130], [131].

This study can be a reference for developing family support and Islamic self-surrender practice as a therapy modality for patients T2DM with depression. Both these methods are simple, cost-effective, and clinically effective to those patients in our population.

VI. CONCLUSION

Multivariate research reveals that self-management is unaffected by age and education, but not by income or length of type 2 DM. Education has an impact on the overall quality of life, while factors such as age, income, and the length of time a person has had type 2 diabetes do not have a significant effect. Patients' awareness of type 2 DM and DM control was not influenced by age, income, education, or duration of type 2 DM. Throughout the surrender exercise, the natural volunteers' support did not affect patient knowledge, but the impact of DM control and self-management on quality of life was reinforced. The qualitative analysis revealed that variables such as age, education, income, length of diabetes mellitus, and medication usage had an impact on the occurrence of type 2 diabetes mellitus and depression. However, gender was shown to have no significant influence. Research has demonstrated that the involvement of family members as voluntary participants and effective communication can enhance the self-management and overall well-being of individuals with type 2 diabetes mellitus who also experience depression. Therefore, type 2 DM management influences the connection between patients' knowledge, self-care, and quality of life.

Natural volunteers contribute to community empowerment initiatives aimed at promoting the health of people with type 2 diabetes and depressive symptoms. To encourage healthy lives, they rely on social institutions and community networks. This idea is consistent with the theory of planned behavior, which holds that people are more

likely to adopt positive actions if they have serious goals and support from others around them, including natural volunteers. According to the concepts of social cognitive theory, individuals with depression and type 2 diabetes can benefit from observing natural volunteers who serve as positive examples. People who suffer from depression and diabetes can learn more effective ways to control their ailments by witnessing firsthand the benefits that natural volunteers provide.

Other studies that aim to improve the quality of life and glycemic control in this population should consult this study, which has important methodological implications due to its focus on individuals with type 2 diabetes who have depressive symptoms and receive resignation training.In practical terms, this study's findings can guide medical professionals in the development of natural volunteer programs and surrender techniques for use in type 2 diabetes management, particularly for individuals with depression. Other chronic disorders, particularly those of individuals susceptible to depression, can also benefit from this strategy. Volunteers who occur naturally are beneficial not only in terms of medical care, but also in providing support for the patient's mental and spiritual well-being. The act of submission, which incorporates controlled breathing, dhikr (the repetition of sacred phrases), and guided visualization, is a straightforward, cost-effective, and culturally suitable exercise for the majority of Indonesians.

The recommendations made in this study have wide-ranging effects for researchers, policymakers, healthcare providers, academic institutions, and families of type 2 diabetic patients. Legislators and healthcare organizations should create criteria for depression screening and incorporate surrender exercises and natural volunteering into the clinical pathway as a normal aspect of treatment for individuals with type 2 diabetes who exhibit depressive symptoms. Educational institutions should incorporate this paradigm as an adjunctive therapy in health education. We should undertake additional research using more rigorous methodologies, encompassing a greater number of healthcare facilities and larger sample sizes. Furthermore, families of individuals with type 2 diabetes can also be vital contributors to therapy and routine exercise since they are natural volunteers. Successful application of these suggestions can improve the management and quality of life for patients diagnosed with type 2 diabetes mellitus and depressive symptoms. Additionally, they can offer directions for improving clinical practice.

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