Characteristics and Care Quality of Patients with Type 2 Diabetes in Indonesia: A Study of DISCOVER CaReMe Registry Program

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ABSTRACT

Background: *Type 2 diabetes mellitus (T2DM) is considered one of the top 3 causes of death in Indonesia. However, the current scenario regarding the management of T2DM in Indonesia remains unclear. Thus, the present study aimed to describe the baseline characteristics, treatment types, and quality of care indicators in T2DM patients under the DISCOVER CaReMe Registry program.* ***Methods:*** *DISCOVER CaReMe Registry program is a multi-centre, prospective, and observational study conducted over 3 years from 2018-2021. The data were collected from five different sites across Indonesia.* ***Results:*** *A total of 539 patients with a mean age of 58.98 ± 9.76 were enrolled in the study. Among them, 62% (334/539) of patients were females. Further, the mean glycated haemoglobin (HbA1c) levels were 8.54 ± 2.88%, which was much higher than the American Diabetes Association (ADA) recommended target of 7%. Overall, 69% of the patients had HbA1c levels of >7%. First-line treatment in patients was mostly metformin (26%). As per the quality-of-care indicators, 72.2% of patients use glucose monitoring equipment and receive education about diabetes treatment and management. Furthermore, the knowledge of T2DM among patients was assessed in over 85% of cases, and misconceptions about the condition were clarified by healthcare professionals (HCPs). HCP advised a "diabetic diet" to 69.4% of patients.* ***Conclusion:*** *Despite a good knowledge and quality of care indices in patients with T2DM, the proportion of patients with HbA1c levels of >7% is still higher. There is an urgent need for diabetic management programs to prevent such complications in the Indonesian population.*

Keywords: *DISCOVER CaReMe study; Type 2 diabetes mellitus; quality of care; HbA1c.*

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of the leading global and regional causes of death worldwide, besides cardiovascular diseases (CVDs) and chronic kidney diseases (CKDs).[1] T2DM accounts for approximately 90% of live cases and 1.8% of deaths in low to middle-income countries. Among these countries, Indonesia is ranked seventh globally with the highest absolute prevalence of diabetes, affecting 10.7 million people in 2019. It is predicted and projected to reach 16.6 million by 2045.[2.] Evidence in the literature suggests that diabetic management conditions are suboptimal in low to

middle-income countries such as Indonesia. The increasing prevalence of diabetes poses a great threat to the healthcare system and may cause an economic burden to society.[3]

Diabetes is associated with an increased risk of cardiovascular events and mortality. Several clinical and cross-sectional studies suggest crosstalk between renal, cardiovascular, and diabetic complications; thus, a multi-disciplinary approach is needed for the management of patients.[4] Glycaemic control, management of these co-morbidities, and optimal therapies are obligated for the effective treatment of patients with T2DM. Glycated haemoglobin (HbA1c) was considered an optimized measure of glycaemic control. The American Diabetes Association (ADA) "Standards of Medical Care in Diabetes" has recommended guidelines for the components of diabetes care, general treatments, and tools to evaluate the quality of care in clinical practice.[5] As per ADA, the recommended HbA1c target of <7% without significant hypoglycaemia is appropriate. Next, clinical guidelines for diabetes management recommend the use of metformin as first-line glucose-lowering therapy. In a hospital-based cross-sectional study, Aminda et al. (2019) recruited 195 patients with T2DM and observed the effect of adherence to antidiabetic medication. The authors reported that the early detection and management of diabetes with first-line glucose-lowering therapy showed better glycaemic control.[6] When monotherapy fails, combination therapy is approached for the treatment of diabetes. In a VERIFY trial, it was shown that early combination therapy can improve blood glucose levels better and delay the need for insulin than a stepwise approach for T2DM management.[7] Due to contradictory studies in the literature, there is no consensus on the treatment therapies. The T2DM treatment is recommended on the basis of patient characteristics such as age, body mass index (BMI), duration of diabetes, comorbidities, and other risk factors using an individualized and patient-centred approach.[8]

An important aspect of T2DM and its management protocols, i.e., public awareness, is poor, which makes it more challenging to control the disease and other associated factors (blood glucose and HbA1c).[9] Studies on the role of healthcare professionals in public awareness regarding diabetes management and in improving quality of care indices are limited.

Based on this background, the DISCOVER CaReMe Registry program aimed to describe the baseline characteristics, associated comorbidities, development of complications, treatment types, and quality of care indicators in patients with T2DM.

METHODS

Study Design

The DISCOVER CaReMe Registry program is a multi-centre, multi-national, prospective, and observational (non-interventional) study conducted over 3 years from 2018-2021. The study protocol was approved by the Institutional Review Board (IRB) at each participating site. The study protocol for clinical research complies with the Declaration of Helsinki, the International Conference on Harmonisation of Good Clinical Practice, and the local regulations.

Site Selection

The data were collected from five different sites across Indonesia by healthcare investigators, including physicians, endocrinologists, and other specialists who were involved in the management of patients with type 2 diabetes mellitus. These five sites included were primary, secondary, tertiary, private owned, or state-owned health care facilities.

Patient Recruitment

A total of 539 patients were enrolled on the basis of inclusion and exclusion criteria. Patients aged ≥18 years old who had type 2 diabetes, heart failure, and/or chronic kidney disease were included in the study. Conversely, patients with type 1 diabetes or having life-threatening co-morbidity with a life expectancy below 1 year were excluded from the study. Written informed consent was obtained from each participating patient before their enrolment.

Data Collection

Data of the patients were collected at baseline only using a standardized case report form. The data variables included patient demographics

(age, sex, ethnicity, education, marital status, employment status, etc.), clinical characteristics (weight, height, BMI, blood pressure, smoking, alcohol status, comorbidities, etc.), medical history, treatment types, laboratory tests (HbA1c, lipid profile, blood test, sugar test, etc.), and quality of care metrics (knowledge regarding the management of diabetes).

Statistical Analysis

Categorical data are presented as numbers and percentages. Continuous data are reported as mean (standard deviation [SD]), where appropriate. The sample size was calculated using 'G*Power version 3.1.9.6' statistical software. In 2017-18, the prevalence of T2DM in the Indonesian population was estimated to be 10.9.7%. Keeping 80% power and 5% significance, the sample size was estimated to be 535.

RESULTS

Demographics and Clinical Characteristics

In the DISCOVER CaReMe Registry program, a total of 539 patients with a mean age of 58.98 ± 9.76 were enrolled from five different sites in Indonesia. Among them, 62% (334/539) of patients were females and 38% (205/539) were males. Approximately 70% patients were Asian and had governmental health coverage. Of 539 patients, most of the patients had attained secondary education (40.1%), were married (65.5%), were currently not working (56.2%), and were decision-makers in the family (68.8%). The mean BMI and waist circumference of the recruited patients were found to be 24.68 ± 4.01 kg/m^2 and 95.37 ± 10.06, respectively. The majority of the patients had not consumed alcohol in their lifetime (76.8%) and were non-smokers (68.1%). The baseline demographics and clinical characteristics of the recruited patients are detailed in **Table 1.** The patients also had comorbidities such as hypertension, heart-related diseases (stroke, myocardial infarction, stroke, and coronary artery diseases), and/or hyperlipidemia. Other than these co-morbidities, the patients had diabetic foot, retinopathy, kidney diseases, and hypoglycemic events (major and minor), which are the primary reasons for hospitalization. The medical history of the patients is summarized in **Figure 1(a) and Supplementary Table 1.**

Table 1. Demographic features and clinical characteristics of the enrolled patients.

Demographics	Number of patients (n=539)
Age, years (Mean ± SD)	**58.98 ± 9.76**
Sex, n (%)	
- Male	205 (38)
- Female	334 (62)
Self-reported ethnicity, n (%)	
- Asian	03 (0.5)
• South	01 (0.2)
• Chinese	379 (70.3)
• Other	17 (3.2)
- Black	139 (25.8)
- Not known	
Education level, n (%)	
- Primary (1-6 years of education)	76 (14.1)
- Secondary (7-13 years of education)	216 (40.1)
- University / Higher Education (greater than 13 years of education)	105 (19.5)
- No formal education	03 (0.5)
- Not known	139 (25.8)
Marital status, n (%)	
- Single	07 (1.3)
- Married	353 (65.5)
- Divorced	03 (0.5)
- Widowed	36 (6.7)
- Not known	140 (26)

Current employment status, n (%)	
- Employed	
• Full-time	52 (9.7)
• Part-time	33 (6.2)
- Self-employed	
• Full-time	04 (0.7)
• Part-time	03 (0.5)
- Not working	303 (56.2)
- Not known	144 (26.7)
Decision maker in the family, n (%)	371 (68.8)
Family lifecycle status, n (%)	
- Family with adolescents	21 (3.9)
- Family with young children	40 (7.4)
- Unattached young adult	34 (6.3)
- Family in later years	277 (51.4)
- Not known	167 (31)
Health insurance coverage, n (%)	
- Public/governmental	376 (69.8)
- Private	14 (2.6)
- Not known	149 (27.6)
Family history of CVD, n (%)	
- Yes	06 (1.1)
- No	34 (6.3)
- Not known	499 (92.6)
Smoking status, n (%)	
• Current smoker	12 (2.2)
• Non-smoker	367 (68.1)
• Ex-smoker	71 (13.2)
• Not known	89 (16.5)
- Pack-years	7.26 ± 5.21
- Cigarettes per day	3.27 ± 2.83
Alcohol usage, n (%)	
- Lifetime abstainer	414 (76.8)
- Former drinker	02 (0.4)
- Heavy drinker	01 (0.2)
- Social drinker	03 (0.6)
- Not known	119 (22)
Substance use (prohibited drugs), n	02 (0.4)
Weight, kg	65.22 ± 20.61
Height, cm	155.07 ± 29.18
Body mass index, kg/m^2	24.68 ± 4.01
Waist circumference, cm	95.37 ± 10.06
Blood pressure, mmHg	
- Systolic	142.38 ± 49.33
- Diastolic	76.83 ± 14.51
Heart rate, beats per minute	84.02 ± 6.76
Co-morbidities, n (%)	
- Hypertension	44 (8.2)
- Dyslipidaemia	07 (1.4)
- MI	01 (0.2)
- Stroke	06 (1.2)
- CAD	02 (0.4)
- Coronary revascularization	01 (0.2)

Kg = kilograms, cm = centimetre, m= metre, mmHg = millimetre of mercury, MI=Myocardial infarction, CAD= Coronary artery disease, n= number of patients, SD = standard deviation

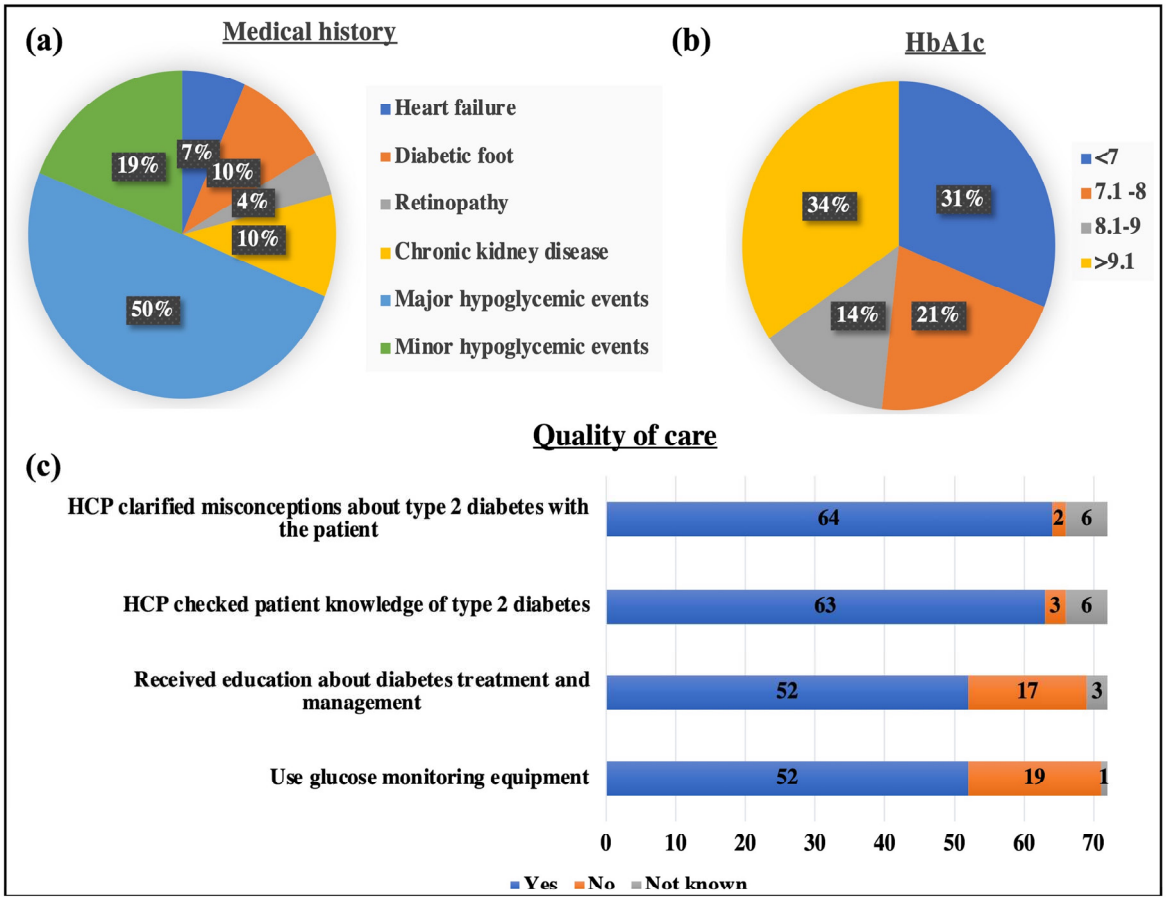

Figure 1. Medical history, HbA1c levels, and quality of care indicators. (a) Medical history: The pie chart delineates the percentage of patients diagnosed with different diseases. **(b)** The HbA1c levels were categorized in four different ranges, i.e., <7, 7.1-8, 8.1-9, and >9. The percentage of patients belonging to different range groups is shown in the form of a pie chart. **(c)** The side graph depicts the frequencies of patients on "quality of care" indicators.

Diagnostic Tests

At baseline, HbA1c levels, fasting blood glucose (FBG), postprandial glucose (PPG), blood tests, lipid profile, and renal function of the patients were assessed, and the findings are summarized in **Table 2**. The mean HbA1c levels were 8.54 ± 2.88%, which was much higher than the American Diabetes Association (ADA) recommended target of 7%. About 69% of the patients had HbA1c levels of >7%. The data is shown in **Figure 1(b).** Further, the levels of FPG and PPG were found to be higher than the normal range, i.e., 185.14 ± 92.63 and 249.88 ± 113.02 mg/dL, respectively. The renal function parameters such as creatinine and uric acid were found to be higher than the normal range, i.e., 6.71 32.56 and 8.58 ± 19.34 mg/dL, respectively.

Treatment Type

In terms of treatment, we found that > 40% of patients had first-line treatment. The medication was repeated from the last visit in approximately 36.2% of patients. The majority of the patients were prescribed anti-diabetic drugs as repeated treatments followed by antihypertensive and antilipidemic drugs. The combination of metformin and biguanides (26%) was the most frequently prescribed treatment agent, followed by glimepiride and simvastatin. The data is shown in **Table 3.**

Quality of Care

It is to be noted that the quality-of-care indicators were assessed in 72 patients only. However, the data obtained is of much significance. More than 70% of patients use glucose monitoring equipment with a mean frequency of 1.13 ± 2.12

Table 2. Diagnostic test results of the enrolled patients.

Parameters	Number of patients (n=539)
Blood test:	
WBC	10.81 ± 4.57
Hematocrit	37.51 ± 4.48
Hb, g	11.99 ± 1.69
Metabolic parameters:	
HbA1c, %	8.54 ± 2.88
FPG, mg/dL	185.14 ± 92.63
PPG, mg/dL	249.88 ± 113.02
Lipid profile:	
TC, mg/dL	196.94 ± 61.75
TG, mg/dL	191.27 ± 133.94
HDL-C, mg/dL	54.84 ± 30.77
LDL-C, mg/dL	151.367 ± 51.35
Renal function:	
Serum creatinine, mg/dL	6.71 ± 32.56
eGFR, mL/min	71.64 37.99
Urine albumin, mg/g	9.34 ± 32.39
Blood urea nitrogen, mmol/L	24.05 ± 8.83
Uric acid, mg/dL	8.58 ± 19.34

WBC = White blood cells, RBC = Red blood cells, Hb = Hemoglobin, FPG = Fasting plasma glucose, PPG = Postprandial glucose, TC = Total cholesterol, HDL = High density lipoproteins, LDL = Low-density lipoproteins, TG = Triglycerides, eGFR = estimated glomerular filteration rate, LFT = Liver function test, g = gram, % = percentage, mg/dL = milligram per decilitre, mL/min = millilitre per minute, IU = International units, n= number of patients, SD = standard deviation.

Table 3. Treatment modalities

Treatment, n (%)	Number of patients (n=539)
Repeat medications from last visit	195 (36.2)
Line of treatment	
- First	236 (43.8)
- Second	143 (26.5)
- Third	92 (17.1)
- >Third	50 (9.3)
Hyperglycemia	
Oral medication	
- Biguanides/Metformin	140 (26)
- Glimepiride	137 (25.4)
- Acarbose	71 (13.2)
- Gliclazide	48 (8.9)
- Gliquidone	07 (1.4)
- Insulin injection	
- Basal insulin	81 (15.1)
- Prandial insulin	15 (2.8)
- Premix insulin	06 (1.1)
- Mean unit (Mean ± SD)	13.39 ± 5.34
Hypertension	
Treatment agents	
- Amlodipine	16 (3)
- Lisinopril	12 (2.2)
- Captopril	06 (1.2)
- Valsartan	06 (1.2)
- Telmisartan	05 (1)
Dyslipidaemia	
Treatment agents	
- Simvastatin	123 (22.8)
- Atorvastatin	33 (6.1)

n= number of patients, SD = standard deviation

times per month and received education about diabetes treatment and management. Group education was used as a mode of education about diabetes treatment and management in 47.2% of patients. Further, the data suggest that > 85% of patients' knowledge of T2DM was checked and misconceptions about T2DM were clarified by healthcare professionals (HCP) at the health centres. In terms of nutritional advice, HCP advised a "diabetic diet" to 69.4% of patients (50/72 patients). The data is shown in **Figure 1(c)** and **Table 4.**

DISCOVER CAREME-REGISTRY VS. DISCOVER COHORT STUDY

This DISCOVER CaReMe Registry is an observational study, while the previously published DISCOVER study was a 3-year prospective cohort study conducted to describe the clinicodemographic profile of T2DM patients, associated vascular complications, and treatment strategies in Indonesia. The differences between the studies are outlined in **Table 5.**

Table 4. Quality of care metrics

Life with diseases	Number of patients (n=72)
Mode of education about diabetes treatment and management:	
- Individual education	08 (11.1)
- Group education	34 (47.2)
- Belongs to a diabetes patients association	02 (2.8)
- Not known	28 (38.9)
Patient awareness of type 2 diabetes support resources:	
- Health centre	59 (81.9)
- Existing programs	02 (2.8)
- Intensity	
- Light	19 (26.4)
- Moderate	05 (6.9)
- Length of each session of physical activity, hr	≤ 1
Nutritional advice provided by HCP	
- Refer to a nutritionist	03 (4.2)
- Calorie counting	08 (11.1)
- Diabetic diet	50 (69.4)
- None	04 (5.6)

HCP=Healthcare Professionals, n= number of patients, SD = standard deviation

Table 5. DISCOVER CaReMe-Registry vs. DISCOVER cohort study

Parameters	DISCOVER cohort study	DISCOVER CaReMe-Registry	p-value
Type of study	Cohort	Observational	-
Number of patients	221	539	<0.0001
Recruitment sites	13	5	<0.0001
Mean age, years	55.6 ± 9.8	58.98 ± 9.76	**<0.0001**
Baseline BMI, kg/m^2	26.4 ± 4.4	24.68 ± 4.01	**<0.0001**
Male: Female ratio (%)	43:57	38:62	-
Systolic BP	127.7 ± 17.2	142.38 ± 49.33	**<0.0001**
Diastolic BP	80.6 ± 8.7	76.83 ± 14.51	**<0.001**
HbA1c, %	9.2 ± 2	8.54 ± 2.88	**<0.01**
FPG, mg/dL	176.5 ± 60.3	185.14 ± 92.63	0.201
PPG, mg/dL	250.0 ± 81.9	249.88 ± 113.02	0.988
TC, mg/dL	204.9 ± 54.5	196.94 ± 61.75	0.095
TG, mg/dL	186.4 ± 182.5	191.27 ± 133.94	0.683
HDL-C, mg/dL	46.3 ± 12.7	54.84 ± 30.77	**<0.0001**
LDL-C, mg/dL	126.8 ± 39.1	151.367 ± 51.35	**<0.0001**
Strengths	Follow-up data for 3 years	The number of patients is quite high; the quality-of-care indices was checked	-

BP = Blood pressure, Hb = Hemoglobin, FPG = Fasting plasma glucose, PPG = Postprandial glucose, TC = Total cholesterol, HDL = High density lipoproteins, LDL = Low-density lipoproteins, TG = Triglycerides

DISCUSSION

The DISCOVER CaReMe registry program was designed as an extension of the existing DISCOVER global observational study.[10] This program provides real-world insights and a comprehensive picture of specific characteristics, cardiovascular, renal, and metabolic disease areas, treatment types, and quality of care indices in patients with T2DM by collecting the data from five different clinical sites representing primary care, secondary care, rural, and urban locations. The investigators were primary care practitioners, diabetologists, endocrinologists, and other specialists who are involved in the management of T2DM. Additionally, the inclusion and exclusion criteria were kept minimal to ensure the enrolment of patients with different backgrounds, ethnicities, and socioeconomic statuses into the DISCOVER registry.

Primarily, the baseline demographic data, such as age, sex, ethnicity, education level, employment status, health insurance coverage, etc., were collected after enrolment of the patients. In the DISCOVER CaReMe Registry program, a total of 539 patients with a mean age of 58.98 ± 9.76 were enrolled from five different sites, whereas close to 16000 patients were enrolled from 38 different countries in the DISCOVER global observational study.[11] Our finding reported that approximately 69.8% of patients had public or governmental health insurance coverage. In a study, Putri and Murdi (2019) reported that 65% of the Indonesian population was insured under National Health Insurance, known as *Jaminan Kesehatan Nasional* (JKN) in 2016.[12, 13] The study is in concordance with our data.

In the clinical characteristics, the mean BMI of the recruited patients was found to be 24.68 ± 4.01 kg/m^2, which is classified as at risk of overweight or obese. In the DISCOVER study, the BMI was reported as in the range of obese, i.e., 29.4 ± 6 kg/m^2, much higher than our findings.[11] In another study, Cholil et al. (2019) examined the current state of diabetes care in Indonesian patients with T2DM and reported the mean BMI of 25.4 ± 4.2 kg/m^2.[14] This range also falls in the category of obese and overweight, viz. >25 kg/m^2. The PERKENI guideline proposed overweight and obesity as prime risk factors for T2DM[15]. Other than these, several studies revealed the association of co-morbidities such as dyslipidemia, hypertension, CVDs, and CKDs with obesity and T2DM. In the present study, the Indonesian population was found to be hypertensive with a systolic blood pressure of 142.38 ± 49.33 mmHg. Smoking and alcohol are also considered risk factors of T2DM.[16] However, more than 65% of the population were non-smokers and non-alcoholics. Further, the medical history associated with CVDs, CKD, and diabetes complications, including heart failure, diabetic foot, retinopathy, and major and minor hypoglycemic events, was noted. Due to the high rate of missing data on medical history, it was difficult to find any association.

Next, the diagnostic tests such as blood tests (white blood cells, hematocrit, and hemoglobin), metabolic parameters (HbA1c, fasting and postprandial plasma glucose (FPG and PPG)), lipid profile (total cholesterol, triglycerides, high- and low-density lipoproteins (HDL and LDL)), and renal functions (serum creatinine, estimated glomerular filtration rate, urine albumin, blood urea nitrogen, and uric acid) were measured. In our study, the levels of FPG and PPG were higher than the normal recommended ranges, i.e., 185.14 ± 92.63 and 249.88 ± 113.02 mg/dL, respectively. The plasma glucose data indicate suboptimal glycemic control, suggesting an increased risk of developing diabetic complications.[17] Another important metabolic parameter, i.e., HbA1c, the mean levels of HbA1c were 8.54 ± 2.88%, which was much higher than the American Diabetes Association (ADA) recommended target of 7%. About 69% of the patients had HbA1c levels of >7%. In the DiabCare project, the authors reported inadequate diabetes control in two surveys conducted in Indonesia during 2008-2009 and 2013- and 2014, two-thirds of patients did not achieve the recommended HbA1c target of less than 7%.[14, 18] In another study, Gomes et al (2019) described the characteristics of patients with T2DM initiating second-line glucose-lowering therapy in the global DISCOVER study program. The authors reported that HbA1c levels were consistently high. Approximately >30% of patients had an HbA1c measurement of >9.0%,

which is similar to our findings.[11] In our previous DISCOVER study in Indonesia, we collected the data of 221 subjects from 13 sites and reported HbA1c levels of 8.0±1.8% at baseline and over a 3-year follow-up after initiating second-line therapies.[18] The missing data on HbA1c levels were very high due to affordability issues and suboptimal reporting of HbA1c in clinical settings and geographic regions of low- to middle-income countries.

In terms of treatment, we found that >40% of patients had antidiabetics as first-line treatment, which is much lower than the reported metformin monotherapy as the most common first-line therapy in most of the studies. About 55–91% of patients diagnosed with T2DM received metformin monotherapy.[11, 19, 20] The reasons may be due to the high rate of missing data or lower metformin monotherapy usage in South-East Asian countries.

Lastly, the quality-of-care indices were assessed in 72 patients in our study. Among them, 72.2% of patients use glucose monitoring equipment and received education about diabetes treatment and management through group education. About >85% of patients' knowledge of T2DM was checked, and misconceptions about T2DM were clarified by HCP at the health centres. In terms of nutritional advice, HCP advised a "diabetic diet" to 69.4% of patients. Based on the quality-of-care data, we may suggest that the patients have good knowledge regarding the management of T2DM. However, attention should not be diverted as the data could be obtained from ~13% of the total enrolled population in the study. To the best of our knowledge, this is the first DISCOVER study that has collected data on quality of care.

The effective management of the T2DM condition heavily relies on patient understanding and adherence to treatment goals, which are often hindered by inadequate education and awareness. In our opinion, the lack of education regarding treatment goals among Indonesian patients with Type 2 diabetes is a concerning issue that warrants immediate attention. Based on the high rate of missing data, we opined that many patients may not fully comprehend the importance of maintaining blood glucose levels within target ranges, adhering to medication regimens, adopting healthy lifestyle habits, and seeking regular medical monitoring. Without this crucial knowledge, individuals with Type 2 diabetes may struggle to effectively manage their condition, leading to worsened health outcomes and increased healthcare costs. Furthermore, cultural factors and socioeconomic disparities exacerbate the education gap among Indonesian patients with Type 2 diabetes. Limited access to healthcare resources, language barriers, and traditional beliefs about illness and treatment can hinder patients' ability to receive accurate information and support for managing their diabetes effectively. Additionally, the stigma associated with chronic diseases like diabetes may discourage individuals from seeking help or adhering to treatment recommendations. Therefore, concerted efforts are needed to improve diabetes education and awareness initiatives in Indonesia.

The study has major limitations: 1) Only baseline data of the enrolled patients were collected. 2) The DISCOVER registry was formulated as an observational design, due to which data was collected as per routine clinical practice at each participating site, resulting in a high rate of missing data. 3) Due to the high rate of missing data, parameters such as medical history and comorbidities could not be associated with T2DM. In future studies, this challenge could be addressed through the implementation of standardized electronic data capture systems across all sites, enhanced training for site personnel on data entry, periodic data quality audits, and scheduling dedicated data collection sessions to ensure accurate and complete datasets. 4) The quality of care indicators were assessed in 72 patients only due to a lack of necessary resources, structured education programs, and trained staff at the participating sites, to administer the standardized quality-of-care questionnaire during routine clinical practice. All participating sites were not able to collect this specific data; however, the data remains of significant value.

CONCLUSION

The DISCOVER CaReMe registry program highlighted the baseline characteristics, treatment options, and quality of care metrics in patients with T2DM in Indonesia. Despite good knowledge and quality of care indices, the current scenario of T2DM in the Indonesian population is poor. Therefore, there is an urgent need for more aggressive risk-factor management in patients with T2DM. Our findings also highlight the potential for healthcare policy in Indonesia to prioritize and expand standardized diabetes education programs despite relatively high knowledge levels among patients. Integrating such programs into primary care services, supported by multidisciplinary teams and government-led initiatives, could enhance patient engagement, improve glycemic control, and promote long-term outcomes across both urban and rural healthcare settings.

CONFLICT OF INTEREST

The authors declared that they have no conflict of interest.

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