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A Diabetes-Specific Questionnaires Validated in Indonesia: A Systematic Review

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ABSTRACT

Diabetes is a global problem, and its incidence is increasing yearly. Diabetes-specific instruments are well received by patients for evaluating specific aspects of diabetic disease and are believed to be among the best methods for this evaluation. To identify and compare all validated diabetes-specific questionnaires. Researchers performed searches on three different electronic databases: PubMed, ScienceDirect, and Google Scholar. Studies covering cross-cultural adaptation and validation methodologies in Indonesia with type 1 and type 2 diabetes involving patients of all ages were included. After reviewing the full texts, data related to psychometric characteristics were extracted from each included study. Reliability was rated using Cronbach's alpha. The initial search identified 1,576 studies. After exclusion criteria were applied, 45 studies were included for review. The questionnaires were grouped into 12 domains based on the study focus: adherence (n = 15), quality of life (n = 9), diabetes knowledge (n = 6), self-efficacy (n = 9), attitude toward diabetes (n = 2), emotional stress (n = 8), expectations (n = 1), perception of disease severity (n = 1), risk of developing diabetes (n = 1), family support (n = 3), diet (n = 1), and religiosity (n = 1). This study identified and reviewed all diabetes-specific questionnaires that have been validated for use in Indonesia to assist researchers in selecting the most appropriate instrument for each domain of interest in future research and clinical settings.

Keywords: Indonesia, Questionnaire, Diabetes Mellitus, Validation, Development

INTRODUCTION

Diabetes is a global problem and its incidence is increasing yearly (World Health Organization, 2021). In 2019, 1.5 million deaths were directly caused by diabetes; 48% of these deaths occurred in individuals younger than 70 (PAN American Health Organization, 2021; World Health Organization, 2021). It is estimated that in 2045, 629 million people worldwide will have diabetes (International Diabetes Federation, 2018; World Health Organization, 2021). Indonesia ranks sixth in the world in regard to diabetes prevalence, with 10.3 million people currently diagnosed with diabetes. This is estimated to increase to 21.3 million people by 2030(Khairani, 2019).

Treatment often involves strict discipline in regard to diet, physical activity, mental health, and quality of life to control glucose levels (Dugbartey *et al*., 2022; McGurnaghan *et al*., 2021). Diabetes requires regular monitoring by health workers and a multidisciplinary approach (Cheng *et al*., 2021; Speight *et al*., 2021). The complications associated with diabetes are cause for concern. Thus, regular and accurate evaluation is necessary to assess the success of a treatment program (Bonora *et al*., 2021; Harvey *et al*., 2021; Misra *et al*., 2021).

Questionnaires, scales, and other instruments are important tools for evaluating many chronic diseases, including diabetes, in both clinical practice and research (Angullo-Martínez *et al*., 2021). Questionnaires are effective tools for collecting data on behaviors, knowledge, and attitudes by providing standardized and structured questions (Angullo-Martínez *et al*., 2021; Speight *et al*., 2021).

Questionnaires can be classified as those used to assess several aspects of health and make comparisons between patients and healthy people or specific questionnaires used to evaluate certain diseases (Chernyak *et al*., 2016; Ingersgaard *et al*., 2022; Mulvaney *et al*., 2014; Shnaimer *et al*., 2022). Previous research (Carlton *et al*., 2017) indicates that the development of diabetes-specific instruments is required as managing diabetes impacts several aspects of a patient's life. Diabetes-specific instruments have been well-received by patients for evaluating specific aspects of the disease (Felix *et al*., 2021; Świątoniowska *et al*., 2020; Wilbur, 2013). These instruments are believed to be one of the best methods for evaluating certain characteristics of diabetes (Chernyak *et al*., 2017). The number of cross-cultural questionnaires adapted and validated for Indonesia is insufficient to meet the demand associated with the high incidence of diabetes in Indonesia (Rachmah *et al*., 2021). A previous systematic review (Bottino *et al*., 2020) assessed cross-cultural diabetes-specific questionnaires validated in Brazil. To the authors' knowledge, no study has compared all available instruments to facilitate the selection of appropriate questionnaires for future research on each characteristic in Indonesia. Therefore, this study aims to identify and compare all validated diabetes-specific questionnaires.

MATERIALS AND METHODS

This systematic review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) https://www.crd.york.ac.uk/prospero/ with registration number CRD42022337394. The systematic review complied with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) reporting method.

Sources and Search Strategy

A literature search was carried out independently on two databases (ScienceDirect and PubMed) by three researchers (I.P., R.S., and W.RI) to identify diabetes-related questionnaires, scales, and other tools that have been translated, adapted, and validated in Indonesia. Google Scholar was also used to reduce publication bias and to include unpublished data or unaggregated publications. We use keywords in Indonesian and English for the literature search (Table I).

Table I. Literature Search Strategy for Databases

#1 Bahasa Indonesia keywords: Diabetes Melitus AND Diabetes Melitus Type 1 dan 2 OR Kuisioner Diabetes Melitus OR Validasi AND Pengembangan OR Indonesia.
#2 English keywords: Diabetes Mellitus AND Type 1 and 2 Diabetes Mellitus OR Questionnaire Diabetes Mellitus OR Validation AND Development OR Indonesia.

Eligibility Criteria

Several inclusion criteria were used to select studies for review. Studies had to have been conducted in Indonesia, involve the creation or validation of questionnaires, scales, or other instruments related to diabetes, or be research involving the adaptation of standard questionnaires, self-developed questionnaires, and questionnaire validation (including face validation, construct validation, and content validation). Studies were excluded if a validated instrument ruled out the inclusion of a risk score and required additional data, such as laboratory or imaging exam results, Cronbach's alpha value < 0.70 and > 0.99. Study searches were not limited to specific publication years.

Study Selection

In the first step of study selection, selections were made using the "Mendeley" reference manager. This involved going to the directory of each database and removing duplicates. Studies that met the inclusion requirements based on their titles and abstracts were registered in a file named "potential." The full texts were independently read by four researchers (I.P., R.S., R.A.D.S., and W.R.). Texts that met the inclusion criteria were placed in a folder called "submitted for review." Data extraction was carried out independently by three researchers (I.P., R.S., and W.R.) for each included study.

Data Extraction

Three researchers (I.P., R.S., and W.R.) independently extracted the data from each study. The data extracted included first author, year of publication, instrument names in English and Indonesian, the population used for validation, target age, data reliability, type of validation, tool period, management methods (reported separately or managed by interviewers), public access

instruments, number of entries and columns, scores, and thresholds. When researchers disagreed regarding research that validated the same questionnaire but with a different number of samples, the disagreement was first attempted to be resolved by discussion. If it was not resolved, the second researcher (R.S.) was brought in. Data were imported into a Microsoft Office ExcelTM spreadsheet.

Quality Assessment

We assessed the risk of bias in each of the included studies using Cochrane instruments. We used Cronbach's alpha to determine the reliability of the instruments included, with a minimum tolerance of 0.70. Values below this were considered indicative of weak reliability and not worthy of review inclusion. The maximum value was 0.99, as values above this could indicate item redundancy, whereby several items measure the same structure. Typically, a Cronbach's alpha of 0.71–0.98 is preferred.

RESULTS AND DISCUSSION

The database searches identified 1,656 studies along with additional research results. A total of 224 duplicates were excluded. Therefore, 1,410 studies were analyzed based on their titles and abstracts. Following this, 1,322 were excluded as they did not fit the research objectives (n = 739), were not diabetes research (n = 498), or were not conducted in Indonesia (n = 85). Therefore, 88 studies were submitted for full-text review. Of these, 43 were excluded as the full texts were not available. In total, 45 studies were selected for review. We also included a questionnaire in the form of a publication manuscript (thesis, theses, dissertation) as it provided sufficient information for review purposes.

In total, 36 instruments were adapted and/or validated in the included studies. Several validations were performed on the same questionnaire but in different populations, such as individuals with diabetes mellitus type 1 and type 2 (Arifin, 2016; Fatimah, 2016; Fatoni, 2012; Hadiati *et al*., 2019; Priasmoro and Ispriantari, 2017).

Revised and developed questionnaires related knowledge (A'yun, 2014; Ihza, 2021; Kurniasari, 2012; Mardiah, 2012; Mufidah *et al*., 2017; Washia, 2014), medication adherence (Amaliah, 2018; Arifin, 2016; Damanik, 2020; Delianty, 2015; Ihza, 2021; Indri, 2019; Komala, 2016; Kurniasari, 2012; Kurniawan *et al*., 2020; Mufidah *et al*., 2017; Mutoharoh, 2017; Prananda, 2015; Rasdianah *et al*., 2016; Yuliani, 2019; Yustiana, 2017), quality of life questionnaires (Akrom *et al*., 2019; Amrah, 2018; Damanik, 2020; Dzusturia, 2016; Fatoni, 2012; Kusnanto, 2013; Rias, 2015; Y. Wahyuni *et al*., 2014; Windiarti, 2017), self-efficacy (Dzusturia, 2016; Ekayasa, 2017; Fatimah, 2016; Indrayana, 2016; Keban and Ramdhani, 2016; Nadziroh, 2016; Rias, 2015; Wahyuni *et al*., 2014; Yustiana, 2017), and emotional stress (Hidayati, 2017; Mahmudah *et al*., 2016; Nadziroh, 2016; Owen, 2015; Priasmoro and Ispriantari, 2017; Putri, 2017; Ramdani, 2016; Syahrir, 2016).

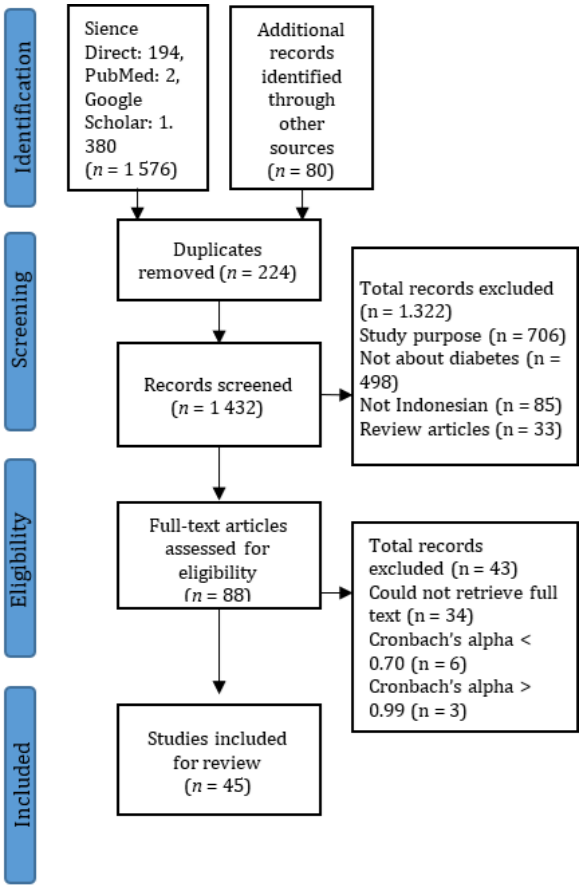

Figure 1. Flow diagram based on the Preferred Reporting Items for Systematic Review and Meta-Analyses statement

One study validated a questionnaire for use in patients with type 1 and type 2 diabetes. However, the sample only included patients with type 2 diabetes (Priasmoro and Ispriantari, 2017). Therefore, we included this study as a validated questionnaire for patients with type 2 diabetes.

This questionnaire had a Cronbach's alpha of 0.848 (P < 0.001).

To facilitate understanding and enable comparisons between the questionnaires, we divided the questionnaires into 12 major domains based on the main focus of the questionnaire. In the medication adherence domain, 15 questionnaires were obtained with Cronbach's alphas of 0.787–0.828 for patients with type 1 diabetes and 0.723–0.918 for patients with type 2 diabetes. In the quality of life domain, 9 questionnaires were obtained with Cronbach's alphas of 0.700–0.842 for patients with type 1 diabetes patients and 0.700–0.963 for patients with type 2 diabetes. For patients with type 2 diabetes, we found one validated questionnaire for patients with type 1 diabetes. In the attitude toward diabetes domain, 2 questionnaires were obtained with Cronbach's alphas of 0.900 for patients with type 1 and type 2 diabetes. In the self-efficacy domain, 9 questionnaires were obtained with Cronbach's alphas of 0.822–0.975. for type 2 diabetics. There were no questionnaires validated for type 1 diabetes in this domain. In the hope for recovery domain, 1 questionnaire with a Cronbach's alpha of 0.780 was validated for type 2 diabetes. For the stress and emotional domain, 8 questionnaires were obtained with a Cronbach's alpha of 0.911 for type 1 diabetes and 0.741–0.948 for type 2 diabetes. In the perception of disease severity domain, 1 questionnaire was validated for type 2 diabetes with a Cronbach's alpha of 0.812. In the diabetes risk domain, 1 questionnaire was validated for type 1 diabetes with a Cronbach's alpha of 0.967. In the family support domain, 3 questionnaires were obtained with Cronbach's alphas of 0.718 for type 1 diabetes and 0.718–0.963 for type 2 diabetes. In the religiosity domain, 1 questionnaire was validated for type 2 diabetes with a Cronbach's alpha of 0.839. Overall, the included studies reported Cronbach's alphas of 0.7–0.9 (Table II).

The overall risk analysis of bias found that the studies, on average, had a low risk of bias (Figure 2 and Table III). Most of the studies used a methodological basis to determine the sample used to validate the questionnaire. We encountered some difficulty during data extraction due to a lack of clarity in the description of some methodological processes.

To ensure that diabetes patients in Indonesia receive the best possible care, it is important to develop specific tools to help healthcare professionals monitor such patients. This study analyzed the available and validated diabetes-specific questionnaires in Indonesia to assist researchers in selecting the appropriate questionnaire to use in research on diabetes patients in Indonesia. We found 10 studies that validated more than 1 questionnaire. A total of 36 questionnaires (Akrom *et al*., 2019; Arifin, 2016; Damanik, 2020; Delianty, 2015; Komala, 2016; Kurniasari, 2012; Nadziroh, 2016; Putri, 2017; Rias, 2015; Yustiana, 2017) were validated in different populations of people with type 1 and type 2 diabetes (children, adolescents, and elderly).

Several studies have shown that the use of disease-specific questionnaires provide better results than general questionnaires (Indrayana, 2016; Keban and Ramdhani, 2016). A general tool can compare individuals with and without diabetes; however, there are concerns that generic healthcare measures are not sensitive enough to capture all aspects of the patient experience. Therefore, diabetes-specific measures are needed to assess the overall impact of the disease and interventions. Specific tools can better assess the unique aspects of a particular disease and its impact on patients' lives (Kusnanto, 2013). For example, diabetes-specific tools can assess the burden of using diabetic insulin in public.

One questionnaire domain is medication adherence. Following recommendations is one way for patients to manage their health. Questionnaires assessing the extent of patient adherence to such recommendations (i.e., a medication adherence questionnaire) have been very effective in producing accurate research results. Questionnaires assessing the use of oral antibiotics had the highest reliability value (Delianty, 2015). This domain included both general medication adherence (Indri, 2019) and the level of medication adherence across all aspects of life, such as physical activity, compliance with blood glucose checks, adherence to insulin use, diet compliance, care adherence, and self-management compliance, among others.

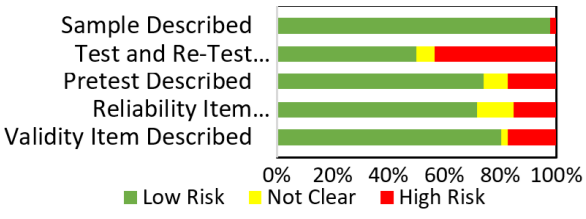

Figure 1:Within group bias risk assessment study

Table II. Summary of study characteristics

Areas of interest	Author, year	Instruments (Indonesia)	Instruments (English)	Population /sample size	Item domains	Application time	Cronbach's alpha
Adherence to treatment	Komala (2016)	Kuisioner kepatuhan diet diabetes melitus	NA	T2DM/42 people	20 items	NA	0.878
	Mufidah *et al*. (2017)	Kuisioner nkepatuhan diet DMT2	NA	T2DM/31 people	15 items	10 min	0.724
	Kurniasari (2012)	Kuisioner kepatuhan pengobatan	Modified Morisky Scale (MMS)	T2DM/83 people	6 items	5 min	NA
	Prananda (2015)	Kuisioner kepatuhan diet diabetes melitus tipe 2	NA	T2DM/60 people	12 items	5 min	0.882
	Delianty (2015)	Kuisioner kepatuhan diet pada pasien diabetes melitus	NA	T2DM/54 people	10 items	5 min	0.832
	Arifin (2016)	NA	Medication Morisky Adherence Scale (MMAS-8)	T1/T2DM/135 people	8 items	5 min	0.787
	Mutoharoh (2017)	Kuisioner DKQ-24 versi indonesia	Diabetes Knowledge Questionnaire	T2DM/18 people	24 items	10 min	0.723
	Kurniawan *et al*. (2020)	MMAS8 Well-being	MMAS8	T1DM/15 people	8 items	2017	0.836
	Yuliani (2019)	Morisky Medication Adherence Scale (MMAS-8)	Morisky Medication Adherence Scale (MMAS-8)	T2DM/24 people	8 items	NA	0.836
	Yustiana (2017)	Instrumen determinan dukungan keluarga terhadap kepatuhan diet	NA	T2DM/128 people	Knowledge = 11 items, attitude = 12 items, action = 14 litems	NA	0.918
	Ihza (2021)	ARMS	ARMS	T2DM/50 people	12 items	NA	NA
	Damanik (2020)	Kuisioner kepatuhan diet	NA	T2DM/194 people	18 items	NA	0.902
	Indri (2019)	Morisky Medication Adherence Scale-8 (MMAS) versi Indonesia	Morisky Medication Adherence Scale (MMAS)	T2DM/49 people	8 items	NA	NA
	Amaliah (2018)	Morisky's Insulin Adherence Scale (MIAS-8)	Morisky's Insulin Adherence Scale (MIAS-8)	T2DM/35 people	8 items	NA	NA
	Rasdianah *et al*. (2016)	Morisky Medication Adherence Scale-8 (MMAS)	Morisky Medication Adherence Scale-8 (MMAS)	T1DM/123 people	8 items	NA	0.7956
Attitude	Hadiati *et al*. (2019)	Kuisioner sikap penderita diabetes melitus	NA	T1/T2DM/40 people	30 items	15 min	0.900
	Arenre (2020)	Nurse practitioner healthcare	Nurse practitioner healthcare	T2DM using Insulin/62	13 items	NA	NA
Emotional stress	Putri (2019)	Kuisioner tingkat stress pada penderita diabetes	Diabetes Distress Scale (DDS)	T2DM/71 people	17 items	10 min	0.870
	Owen (2015)	NA	Hamilton Anxiety Rating Scale (HARS)	T2DM/60 people	60 items	30 min	NA
	Ramdani (2016)	NA	Beck Depression Inventory (BDI)	T2DM/79 people	21 items	5 min	0.741
	Syahrir (2016)	NA	Kuisioner DASS	T2DM/214 people	14 items	5 min	0.948

Areas of interest	Author, year	Instruments (Indonesia)	Instruments (English)	Population /sample size	Item domains	Application time	Cronbach's alpha
Emotional stress	Priasmoro & Ispriantari (2017)	NA	T2DM/65 People	20 people	17 items	10 min	0.863
	Nadziroh (2016)	NA	Cope Inventory	T2DM/36 people	28 items	10 min	0.791
	Hidayati (2017)	Kuisioner mekanisme koping	Mini-Mental State Exam (MMSE)	T2DM/84	11 items	NA	NA
Hope	Komala (2016)	Mini-Mental State Exam (MMSE)	NA	T2DM/42 people	20 items	NA	0.870
Knowledge	A'yun (2014)	Kuisioner motivasi diabetes melitus	NA	T2DM/42 people	16 items	5 min	0.882
	Mardiah (2012)	Kuisioner NOC Diet	NA	T2DM/71 people	30 items	10 min	0.799
	Mufidah *et al*. (2017)	Kuisioner MMS	NA	T2DM/53 people	10 items	5 min	0.926
	Kurniasari (2012)	Kuisioner pengetahuan diabetes	NA	T2DM/83 people	30 items	10 min	0.731
	Washita (2014)	Kuisioner pengetahuan diabetes	NA	T2DM/45 people	12 items	5 min	0.815
	Ihza (2021)	Kuisioner pengetahuan klien terhadap upaya pencegahan ulkus diabetik	NA	T2DM/50	15 items	NA	0.805
	Windiarti (2017)	Kuisioner pengetahuan skala gutman	World Health Organization Quality of Life (WHOQOL)	T2DM/70 people	NA	NA	0.963
	Kusnanto (2013)	Kuisioner kualitas hidup dari WHO	World Health Organization Quality of Life (WHOQOL)	T2DM/50 people	NA	NA	0.963
	Fatoni (2012)	Kuisioner prilaku sosial, kuisioner kondisi sosial, kuisioner kondisi spiritual	Health Related Quality of life (HR-QOL)	T1/T2DM/100 people	36 items	15 min	0.700
	Wahyuni *et al*. (2014)	NA	Quality of Life Instrument for Indian Diabetes Patients (QOLID)	T2DM/89 people	34 items	15 min	0.,915
	Damanik (2020)	NA	World Health Organization Quality of Life (WHOQOL-IN SHORT)	T2 DM,194 people	26 items	NA	0.941
	Akrom *et al*. (2019)	World Health Organization Quality of Life (WHOQOL-BREF) versi Indonesia	EQ5D	T2DM/109 people	5 items	NA	NA
	Dzusturia (2016)	EQ5D	Diabetes Quality of Life (DQOL)	T2DM/30 people	30 items	NA	0.963 (from a previous study)
	Amrah (2018)	Diabetes Quality Of Life (DQOL)	Diabetes Quality of Life Clinical Trial Questioner (DQLCTQ)	T2DM/30 people	34 items	10 min	0.750
	Rias (2015)	Diabetes Quality of Life Clinical Trial Questioner (DQLCTQ)	NA	T2DM/15 people	26 items	NA	0.917

Areas of interest	Author, year	Instruments (Indonesia)	Instruments (English)	Population /sample size	Item domains	Application time	Cronbach's alpha
Perception of disease severity	Arifin (2016)	Quality of Life	Brief Illness Perception Questionnaire (B-IPQ)	T1/T2DM/135 people	9 items	5 min	0.812
Risk of diabetes	Sina (2019)	NA	Diabetic Neuropathy Symptoms (DNS) Diabetic Neuropathy Examination (DAN)	T2DM/52 people	28 items	2019	NA
	Virrizqi (2019)	Diabetic Neuropathy Symptom (DNS) Diabetic Neuropathy Examination (DAN)	NA	T2DM/30 people	25 items	2019	0.967
Satisfaction	Fatimah (2016)	Kuesioner Deteksi Dini Penyakit Diabetes Melitus Dilihat dariAspek Kesehatan Umum	NA	T1/T2DM/35 people	29 items	20 min	0.718
	Damanik (2020)	Kuisioner dukungan keluarga	Hensarling's diabetes Family support scale (HDFSS)	T2DM/194 people	27 items	NA	0.963
	Akrom, *et al*. (2019)	Hensarling's Diabetes Family Support Scale (HDFSS)	TSQM	T2DM/109 people	14 items	NA	NA
Self-efficacy	Ekayasa (2017)	TSQM	Summary of Diabetes and Self-Care Activity (SDSCA)	T2DM/28 people	12 items	5 min	0.923
	Indrayana (2016)	NA	Kuisioner Diabetes Management Self Efficacy Scale (DSMES)	T2DM/30 people	20 items	10 min	0.975
	Nadziroh, (2016)	Kuisioner Efikasi diri pengelolaan diabetes	Kuisioner Diabetes Management Self Efficacy Scale (DSMES)	T2DM/36 people	20 items	10 min	0.975
	Fatimah (2016)	Kuisioner Efikasi Diri	Diabetes Self-Management Questionnaire (DSM)	T1/T2DM/35 people	16 items	10 min	NA
	Keban and Ramdhani (2016)	Kuisioner manajemen diri	Diabetes Self Management Questionnaire (DSMQ)	T2DM/109 people	16 items	10 min	0.889
	Wahyuni *et al*. (2014)	Diabetes Self-Management Questionnaire	NA	T2DM/25 People	16 items	NA	0.832
	Yustiana (2017)	Diabetes Self-Management Questionnaire	Diabetes Obstacles Questioner (DOQ)	T2DM/35 people	28 items	NA	0.822
	Rias (2015)	Diabetes Obstacles Questioner (DOQ)	Short Self Regulation Questionnaire (SSRQ)	T2DM/22 people	25 items	NA	0.880
	Rias (2015)	The Short Self Regulation Questionnaire (SSRQ) Modifikasi	Summary of Diabetes Self-Care Activities (SDSCA)	T2DM/25 people	12 items	NA	0.917
	Dzusturia (2016)	The Summary of Diabetes Self-Care Activities (SDSCA)	Kuisioner Diabetes Management Self Efficacy Scale (DSMES)	T2DM/30 people	30 items	Na	0.963
Diet	Fahrudini (2018)	Kuisioner pola makan pada penderita diabetes tipe 2	NA	T2DM/52 people	20 items	5 min	0.966
Religiosity	Putri (2017)	Kuisioner Religiusitas	NA	T2DM/71 people	19 items	10 min	0.839

Table III. Summary Group Bias Risk Assessment

No	Author, year	Sample size described	Pre-test Described	Test and retest described	Reliability item described	Validity item described
1	Qurratu a'yun, 2014.	+	+	+	+	+
2	Fahrudini, 2015.	+	+	-	+	+
3	Mardiah, 2012.	+	+	-	?	+
4	Windiarti, 2017.	+	+	-	+	+
5	Putri, 2017.	+	+	+	+	+
6	Komala, 2016.	-	-	-	+	+
7	Owen, 2016.	+	+	?	-	-
8	Ramdani, 2016.	+	+	+	+	+
9	Mufidah, 2017.	+	+	+	+	+
10	Wulansari, 2017.	+	+	+	+	-
11	Ekayasa, 2016.	+	+	-	?	+
12	Kurniasih, 2012.	+	+	+	+	+
13	Shahrir, 2016.	+	?	+	+	+
14	Prananda, 2015.	+	+	-	+	+
15	Mahmudah, 2016.	+	+	+	+	+
17	Kusnanto, 2013.	+	+	-	+	+
18	Indrayana, 2016.	+	?	+	+	+
19	Nadziroh, 2016.	+	+	+	?	+
20	Delianty, 2015.	+	+	+	+	+
21	Arifin, 2016.	+	+	+	+	+
22	Fatoni, 2012.	+	+	-	+	+
23	Mutoharoh, 2017.	+	+	-	?	+
24	Fatimah, 2016.	+	+	?	+	+
25	Wahyuni, 2014.	+	-	-	+	+
27	Washia, 2014.	+	+	-	+	+
28	Rachman, 2019.	+	-	-	+	+
29	Kurniawan, 2020.	+	-	-	+	+
30	Virrizqi, 2019.	+	+	+	+	+
31	Yustiana, 2017.	+	+	-	+	+
32	M.Ibnu Sina,2019.	+	-	-	-	-
33	Arenre,2020.	+	?	-	?	+
34	Yuliani,2019.	+	-	-	-	-
35	Ihza, 2021.	+	+	+	+	+
36	Damanik, 2020.	+	+	+	+	+
37	Akrom,2019.	+	?	?	?	?
38	Wahyuni, 2019.	+	+	+	+	+
39	Indri Okta, 2019.	+	-	-	-	-
40	Amaliah, 2018.	+	+	+	+	+
41	Dzusturia, 2016.	+	+	+	-	-
42	Amrah 2018.	+	+	+	+	+
43	Rasdianah, 2016.	+	+	+	+	+
44	Rias, 2015.	+	+	+	+	+
45	Hidayati, 2017.	+	+	-	-	-

The medication adherence questionnaires were validated for type 1 and type 2 diabetes and for use in children and adults (Arenre, 2020; Fahrudini, 2018; Washia, 2014; Yustiana, 2017). The Morisky Medication Adherence Scale (MMAS) is often used to assess medication adherence in patients with diabetes. It is considered the best instrument for this purpose (Amaliah, 2018; Arifin, 2016; Indri, 2019; Kurniawan *et al*., 2020; Mutoharoh, 2017; Rasdianah *et al*., 2016; Yuliani, 2019).

When assessing quality of life, most questionnaires assess quality of life as a whole or with certain complications (Fatoni, 2012). The Diabetes Quality of Life Questionnaire (DQOL) assesses the impact of diabetes on various aspects of patient lives, such as their social life, physical activity, gender, and family (Dzusturia, 2016; Mufidah *et al*., 2017). Five versions of this questionnaire are validated in Indonesia for both type 1 and type 2 diabetes patients, as well as a unique questionnaire for young patients with diabetes. All five questionnaires have adequate levels of validity and reliability.

The prevalence of mental disorders in Indonesia is high, with significant disparities between urban and rural areas (Amrah, 2018; Dzusturia, 2016; Fatoni, 2012). There is a need to

better understand the various factors that contribute to mental health problems to develop more effective tools (Amrah, 2018; Dzusturia, 2016; Wahyuni *et al*., 2021).

One important measure of patients' diabetes management and treatment adherence is their knowledge of the disease (Ihza, 2021; Kurniasari, 2012; Mardiah, 2012). The Diabetes Knowledge Scale Questionnaire (DKN-A) has been adapted for use in Indonesia and is reliable and useful (A'yun, 2014).

Hypoglycemia is an important aspect of diabetes management, particularly for patients with type 1 diabetes undergoing intensive care (Arifin, 2016). Indonesia is currently validating a questionnaire on this. There has been significant discussion regarding the impact of technology on society and the future of work. Some believe that technology is benefiting the way we work and society, while others believe that it does more harm than good.

This study has several limitations. First, evaluating specific questionnaires among patients with diabetes limits comparisons with other populations. Interviews were conducted to test the instruments (including consent procedures and the collection of socio-demographic data). Some of the instruments reviewed collected too much characteristic data, making them difficult to manage. This study identified and synthesized the questionnaires that had been validated in Indonesia; however, some questionnaires had not been fully validated. We believe this research expands the current literature by providing reliable information about the validated questionnaires in Indonesia.

CONCLUSION

This systematic review assessed all the diabetes-specific questionnaires that have been validated in Indonesia to help health professionals better follow up and treat patients with diabetes.

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