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Distress Adherence and Quality of Life of Type 2 Diabetes mellitus patients in Indonesia

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Abstract

Purpose: This study is aimed to determine the correlation among distress, adherence and quality of life of diabetic patients.

Methods: We used a cross-sectional design. Data were collected from diabetec patients at RSUD Abdul Azis Singkawang, West Kalimantan, Indonesia, RSUD Meranti and RSUD DOK II Jayapura during 2017 and 2018. Subjects were patients diagnosed with Type 2 Diabetes mellitus (T2DM), aged over 18, and under outpatient treatment at the hospitals in the aforementioned period. We used Diabetes-Distress Scale (DDS), Morisky Medication Adherence Scale-4 (MMAS-4) and EQ-5D to measure distress, adherence and quality of life, respectively. The Structural Equation Modelling (SEM) was used to define the structure of distress, adherence and quality of life.

Results: We recruited 231 patients. The average of blood sugars were high (> 150 mg/dl). The four dimensions of DDS were moderate (< 3.0), most of the patients were in moderate risk of not adherence (55.76%), the index of EQ-5D was around 0.7 and the VAS was around 70%. The deterioration of quality of life is significantly influenced by moderate risk of non- adherence and moderated distress. The deterioration of quality of life is dominantly influenced by the moderate distress level. The moderate risk of non-adherence is correlated with moderate distress.

Conclusion: Patients' distress has significant correlation with adherence. Distress and adherence have significant correlation with quality of life. The moderate risk of non-

adherence of diabetic patients can cause the worse of clinical data, whereas can be the risk of diabetic complications. The psychological intervention can push the patients to cope with the disease and disease treatment.

Keywords: distress, adherence, QoL, diabetes, Indonesia.

1. Introduction

The prevalence of Type 2 Diabetes mellitus (T2DM) in the world has markedly increased. It is estimated that in 2030 the number of T2DM sufferers in Indonesia will reach 21.3 million [1]. Basic Health Research reported that the highest T2DM prevalence occurred in the provinces of Riau (1.0 %), West Kalimantan (0.8 %) and Papua (0.8%) [1]. Diabetes is a chronic disease which can affect patients' quality of life. Health-related quality of life is defines as the multidimensional perspective of patients toward the current condition. The dimensions measure in the perspective of health-related quality of life are physical, psychological, social, cognitive and spiritual [2]. Health-related quality of life is one of the treatment's outcome which reflected the quality of health services. Quality of life is also associated with the quality of pharmaceutical care [3,4]. Currently, the number of research about quality of life in chronic disease is getting increase. Most of the research also made association between predictors of other treatment outcome and quality of life [5].

Some predictors of Health-related quality of life were age, duration of disease, number of drug prescribed, medication adherence and treatment satisfactory. Medication adherence is significantly associated with health-related quality of life. The increase of adherence can improve the quality of life. In T2DM patients, their quality of life significantly related to medication adherence [3]. The low adherence of T2DM patients was mainly due to the complexity of medicine regimens [5]. However, previous studies also mentioned that the adherence is not related to the health-related quality of life [6]. The contradictive reports could be due to the sample size, population characteristics, the adherence method and the instruments that used in the study [7].

The adherence T2DM patients in developed countries are low [8–11]. Many factors can be contributed in this issue, such as; lower literacy, education and counselling session in the health care centers. Education level of the patients also became the barrier of communication between the patients and health care professionals [5].

The T2DM patients also experienced emotional distress due to the limited physical activities, physician – relationship, interindividual-relationship and long term of treatment. Previous studies mentioned that 40% T2DM patients experienced depression and T2DM patients had 2-4 fold greater risk of depression compared to individual without T2DM [12–14]. Some patients' characteristics can predict the depression as the comorbidity such as; older patients, female sex, insulin treatment and the number of complication [15].

According to the high prevalence of T2DM in Indonesia, the objectives of this study were to assess the distress scale, medication adherence and Health-related quality of life and to define the correlations among the scales. We plan to explore the distress, adherence and quality of life in T2DM patients using validated instruments in Bahasa Indonesian versions.

2. Methods

2.1. Participants

We used a cross-sectional design. Data were collected from diabetes patients at RSUD Abdul Azis Singkawang, West Kalimantan, Indonesia, RSUD Meranti and RSUD DOK II Jayapura during 2017 and 2018. The target population was diabetes patients receiving outpatient services at the hospitals. Subjects who met the inclusion criteria were patients diagnosed with T2DM, aged over 18, and under outpatient treatment at the hospitals in the aforementioned period, whereas the ones excluded were

patients who were unwilling to participate in this study and those who were illiterate.

Prior to gathering data from every subject, they were asked for their willingness to partake in this research and to provide informed consent. The blood sampling was done after filling the questionnaires. Data collection resumes only if the patient complies. To facilitate data collection through questionnaires, the researchers accompanied the patients in answering the questions. This study has received approval from the Ethics Committee of the Faculty of Pharmacy at Universitas Ahmad Dahlan Yogyakarta, Indonesia, Number 011701003.

2.2. Questionnaires

The questionnaires utilized in this inquiry was the Indonesian version of Diabetes-Distress Scale (DDS) [16]. Polonsky et al. introduced the DDS on patients with type 1 and T2D at various settings. Patients were asked to express their concern about for 1 month on a Likert scale from 1 (not a problem) to 6 (a very serious problem). This questionnaire has four domains, which are; emotional burden, physician-related distress, regimen-related distress and diabetes-related inter-individual distress [17]. The distress scales were cathegorized into moderate (>2) and high (>3) [18]. Adherence was measured by Morisky Medication Adherence Scale which contains of four scale [19]. The adherence scales were cathegorized into i) adherent, for subjects who answered ‘no’ to all questions, ii) moderate risk of adherence for subjects who answered ‘yes’ in questions number 1 or 2 or in questions number 3 or 4, and iii) high risk of adherence for subjects who answer ‘yes’ in all questions [20]. The quality of life was measured by Indonesian version of EQ5D, which interpreted into index of quality of life and also additional measurement of Visual Analog Scale [21]. All the questionnaires are available in Bahasa Indonesia and fulfilled the reliability and validity criteria.

2.3. Statistical Analysis

We analyzed the data using SmartPLS v.3 software. The Structural Equation Modelling (SEM) was running by SmartPLS v.3. The inner model was defined to evaluate the endogenous factors. Some of tests such as: discriminant validity, convergent validity and reliability were evaluated as endogenous factors. The path coefficient was determined to evaluate the exogenous model as the structural relationship , which can be seen from the standardized coefficient and significance.

3. Results and Discussion

We recruited 231 patients with 59% among them were male. Table 1 shows the T2DM patients’ characteristics. According to the education, occupation, salary, marriage status, family history, most of the patients are high educated, good salary, having family and without family history of diabetic. The patients can survive with monotherapy for less than 5 years of diabetes and the treatment. The average of blood sugars measurements were high (> 150 mg/dl). The four dimensions of Diabetes Distress Scale were moderate (< 3.0), most of the patients were in the moderate risk of non adherence (55.76%), the index of EQ-5D was around 0.7 and the VAS was around 70%. The quality of life was deteriorate because the value of Indonesian health population is 0.921 [22].

In general, the diabetic patients in this study mostly have high of blood glucose, which can be seen from the clinical data such as; random blood glucose, fasting blood glucose, 2 hours-post prandial blood glucose and HbA1C. The average of disease duration of the patients is less than 5 years, in fact most of them are treated by metformin. Combining with the distress, adherence and quality of life, we can see that the patients experienced moderate distress, moderate-risk of non- adherence and the deterioration of quality of life value. Similar results are found in some previous studies, he previous study conducted in US with 139 diabetic patients, also had similar results that patients with uncontrolled T2DM also had depressive symptoms

and moderate distress [23]. Diabetic patients in Malaysia also experienced moderate distress and had negative correlation with quality of life. However, the religiousity had positive impact to the quality of life [24]. Furthermore, in United States population, diabetic patients was related with serious psychological distress and could diminish the quality of life [25].

According to the value of clinical data, the health professionals should be focused on this situation, because the treatment outcome has not been reached yet and most of the patients experienced macrovascular complications. The treatment change or treatment modification should be considered to get the normal treatment outcome. The combination of metformin with linagliptine or sulfonylurea in uncontrolled diabetic patients can be used as the treatment choices [26,27].

Tabel 1. Patients' characteristics and description of DDS, Adherence and QoL (n=231)

Characteristics	**N (%)**	**Mean ± SD**
Age		57.14 ± 9.4
Sex		
Female	95 (41.12)	
Male	136 (58.88)	
Education		
Under Senior High School	87 (37.66)	
Above Senior High School	13 (62.34)	
Occupation		
Jobless	97 (41.99)	
Work	134 (58.01)	
Salary (IDR)		
< 2.200.000	103 (44.59)	
≥ 2.200.000	128 (55.41)	
Marriage Status		
Married	213 (92.2%)	
Single	18 (7.8%)	
Family History of DM		
Yes	98 (42.42%)	
None	133 (57.58%)	
Type of medication		
Monotherapy	201 (87.01%)	
Combination therapy	30 (12.99%)	
Duration of Drug used (year)		
< 5	143 (61.90%)	1.43 ± 0.59
≥ 5	88 (38.1%)	
Duration of DM (year)		
< 5	121 (52.38%)	1.47 ± 0.50
≥ 5	110 (47.62%)	
Complication		
Microvascular	60 (25.97%)	
Macrovascular	132 (57.14%)	
Microcascular and microvascular	38 (16.45%)	
None	1 (0.43%)	
Fasting Blood Glucose (mg/dl)		
<200	117 (50.64%)	184.60 ± 80.43
≥200	114 (49.36%)	
Random Blood Glucose (mg/dl)		
<200	109 (47.19%)	219.64 ± 85.11
≥200	122 (52.81%)	
2 hours pp Blood Glucose (mg/dl)		
<200	67 (29.00%)	271.23 ± 22.7
≥200	164 (70.99%)	
HbA1C (%)		
4.4-6.4	37 (16.01%)	8.68 ± 2.58
6.4-7.4	35 (15.15%)	
>=7.5	159 (68.84%)	

DDS (moderate)		
Emotional-related distress	2.31 ± 1.28	
Physician-related distress	2.35 ± 1.27	
Management-related distress	2.55 ± 1.08	
Interindividual-related distress	2.07 ± 1.25	
Adherence		
Adherent	58 (26.73%)	
Moderate risk of non adherence	121 (55.76%)	
	38 (17.51%)	
High risk of non adherence		
VAS	71.45 ± 14.44	
Index of EQ5D	0.78 ± 0.25	

Patients had moderate distress in the scale of emotional, physician, management and interi-individual. These distresses should be treated by some psychological intervention then it could be increase the patient's adherence. Previous study mentioned that cognitive and/or behavioural intervention for 12 months showed more effective outcomes [23]. A systematic review with 30 randomized controlled trials and 9177 subjects concluded that some evidences showed the effective treatment outcome after psychological interventions [31]. Still in Malaysian study, medication adherence positive correlation with quality of life, meaning that an intervention to adherence could improve quality of life [32]. Continuously, the high adherence will increase the patients' quality of life, because the positive correlation between distress-adherence and adherence-quality of life.

Table 2 shows the results of SEM about the convergent validity of all indicators. All indicators met the criteria of convergent validity with the p value>0.5.

Table 2. Convergen validity (>0.5)

	Adherence	Distress	QoL
DD1		0,760	
DD2		0,678	
DD3		0,734	
DD4		0,758	
E1			0,737
E2			0,547
E3			0,743
E4			0,728
E5			0,727
p-1	0,676		
p-2	0,806		
p-3	0,564		
p-4	0,655		

According to the discriminant validity, it can be seen that all the indicators were highly correlated with their own latent variables (Table 3). Table 4 shows the results of reliability test based on Cronbach alpha, composite reliability and Average Variance Extracted (AVE). All the latent variables met the criteria for the three reliability parameters, except for the adherence which did not meet the AVE criteria (>0.5).

Table 3. Discriminant validity

	Adherence	**Distress**	**Index**	**QoL**	**VAS**
DD1	0,316	**0,760**	0,041	0,322	-0,055
DD2	0,297	**0,678**	0,213	0,067	0,163
DD3	0,317	**0,734**	0,021	0,196	0,051
DD4	0,275	**0,758**	0,106	0,277	-0,055
E1	0,104	0,205	-0,073	**0,737**	-0,443
E2	-0,052	0,046	-0,032	**0,547**	-0,312
E3	0,059	0,143	0,013	**0,743**	-0,399
E4	0,044	0,155	0,210	**0,728**	-0,355
E5	0,173	0,322	0,305	**0,727**	-0,189
IND	0,087	0,122	1,000	0,186	0,043
VAS	0,140	0,023	0,043	-	1,000

				0,441	
p-1	**0,676**	0,182	0,088	0,113	0,081
p-2	**0,806**	0,328	0,101	0,213	0,152
p-3	**0,564**	0,170	0,010	-0,045	0,107
p-4	**0,655**	0,227	0,074	-0,021	0,161

Bold number: meet the discriminant validity

Table 4 Reliability based on Cronbach alpha, Composite Reliability and Average Variance Extracted (AVE)

	Cronbach's Alpha	**Composite Reliability**	**Average Variance Extracted (AVE)**
Adherence	0,700	0,801	0,302
Distress	0,715	0,823	0,538
QoL	0,776	0,826	0,50

The inner model analysis resulted the R square as can be seen in Table 5. The R square value is the determinat of endogenous construct. The R square of this model is weak because the value is less than 0.19. Distress can explained the adherence as much as 11%. Index is inflenced by distress through adherence as much as 1.9% and index is directly influenced by distress as much as 11%. QoL is influenced by distress thourgh index as much as 9.6%. VAS is influenced by distress through adherence, index and QoL as much as 3.3%.

Table 5. R Square of endogenous construct

	R Square
adherence	0,110
index	0,019
qol	0,096
vas	0,033

This model is valid and reliable, because the results of outer model shows that the models meet the criteria for discriminant validity, convergent validity and the reliability based on Cronbach alpha, composite reliability and AVE.

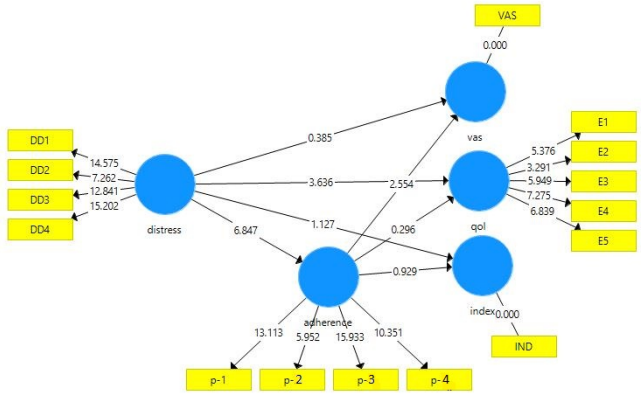
Table 6 shows the path coefficients of distress, adherence and QoL model. The significant correlation can be seen from the correlation between adherence and vas, distress and adherence, distress and QoL. The adherence had positive correlation with VAS (β=0.19; p=0.011). The distress also has positive correlation with adherence and QoL (β=0.33; p=0.000 and β=0.30; p=0.000, respectively). In general, the path coefficient shows that the higher adherence, the higher quality of life,; the higher distress, the higher adherence; and the higher distress, the higher quality of life.

According to the structured model in Fig 1, the deterioration of quality of life is significantly influenced by moderate-risk of non-adherence and moderated distress. Even though, the correlation value is weak because less than 10%. The deterioration of quality of life is dominantly influenced by the moderate distress level. The value of distress scale are in the category of moderate distress level, so that the value of quality of life is good (around 0.7).

Table 6. Path coefficient of distress, adherence and QoL model

	Original Sample	**Mean**	**SD**	**T stat**	**P Values**
adherence -> index	0,072	0,071	0,078	0,929	0,354
adherence -> qol	0,028	0,033	0,095	0,296	0,767
adherence -> vas	0,190	0,194	0,074	2,554	0,011*
distress -> adherence	0,332	0,339	0,048	6,847	0,000*
distress -> index	0,120	0,118	0,083	1,450	0,148
distress -> qol	0,308	0,334	0,071	4,321	0,000*
distress -> vas	0,021	0,013	0,106	0,197	0,844

Index= 0.072 adherence + 0.120 distress; QoL= 0.028 adherence + 0.308 distress; VAS= 0.190 adherence + 0.021 distress; Adherence= 0.332 distress



DD (1-4); indicators of distress; p (1-4): indicators of adherence; E (1-5): indicators of QoL; VAS: Visual Analog Scale; IND: Index of QoL

Fig 1. Structural Model

This present study shows the moderate risk of non-adherence which is correlated with moderate distress. The positive correlation between adherence and distress could be explained that the complexity of treatment, disease and lifestyle could cause the distress, but it can also increase the adherence. Some of the supporting factors like family support should be consider as the way to decrease the distress. The previous study in Malaysia about distress, adherence and quality of life depicted that patients with low level of distress had high adherence and quality of life. Thus, some intervention which can help the patients to cope with the disease and disease treatment may decrease the distress [28]. The previous studies in Germany and Taiwan showed similar results with this present study due to the significant correlation between adherence and quality of life [29,30] .

The SEM analysis can be used to understand the framework of QoL construct development. One of the treatment outcomes for the diabetic patients is to increase the patient's quality of life. Thus, factors that can predict the quality of life can be structured by SEM. This study has limitation, we did not consider the variability of age, sex, treatment and other patients' characteristics in the structured analysis. Also we did not consider the differences of cultures in the three area over Indonesia. Every cultures has its own habit to overcome distress and to cope with the disease.

4. Conclusion

Patients' distress has significant correlation with adherence. Continuously, distress and adherence have significant correlation with quality of life. The moderate risk of non- adherence of diabetic patients can cause uncontrolled of clinical data, whereas can be the risk of diabetic complications. The psychological intervention can push the patients to cope with the disease and disease treatment. Furthermore, the distress level will decrease and can increase the adherence. Quality of life as one of the treatment outcomes can describe whether the treatment is effective or not.

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