

Relationship between emotional distress and quality of life on type 2 diabetes mellitus patients in Meranti island regency hospital

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Abstract. Type 2 Diabetes mellitus (T2DM) always got treatment for a long time so that it can affect the emotional distress and the quality of life. This study aimed to find the relationship between emotional distress with quality of life. This study used cross sectional design. DDS was used to measure patients emotional distress. EQ-5D was used to measure patients quality of life. Subjects of this study were T2DM patients ICD X.E11 with aged over 18 years old. A total of 80 patients participated in the study. The result showed that the mean of score on emotional burden was 2.985 ± 0.678 , physician distress was 2.650 ± 0.801 , regiment distress was 3.222 ± 0.75 and interpersonal distress was 2.529 ± 0.859 . The result of the analysis showed that there was relationship between employment and interpersonal distress with index and correlation showed weak negative ($r=0.212$, -0.306) and significant relationship ($p<0.05$). The relationship between education and VAS showed weak positive correlation ($r=0.334$) and significant relationship ($p<0.01$). The relationship between employment and emotional burden with VAS showed weak negative correlation ($r=0.215$, -0.251) and significant relationship ($p<0.01$). Employment and education was factors that affected the quality of life. High emotional distress can degraded the quality of life.

Keyword : Type 2 diabetes mellitus, emotional distress, quality of life

1. Introduction

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defected in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs [1]. This disease was caused by impaired glucose metabolism due to insulin deficiency both in absolute and relative [2]. T2DM is one of the most common types found of diabetes in more than 90-95% [1].

WHO predicted an increasing number of people with DM in Indonesia from 8.4 million in 2000 to about 21.3 million in 2030. This report showed an increasing number of people with DM 2-3 times by 2035. International Diabetes Federation (IDF) predicted an increasing number of people with DM in Indonesia from 9.1 million in 2014 to 14.1 million in 2035 [2].

Riskesdas report in 2013, Riau province was one of the area in Indonesia with prevalence of DM patients by 1.0% [1] and estimated 41,071 people [3]. Public health of Riau said that 2010 was the highest number of DM patients in the age group 45-54 years (191 cases), second age groups were 60-



69 (120 cases) and third age groups were 25-44 years (108 cases). Public health of Riau data in 2011 stated that in Pekanbaru the number of DM patients about 5.5% [4].

Individual's perception of the cognitive dimension can determine how and why patients can adhere to medical advice [5]. The cognitive representation consisted of five attributes: identity, time, consequence, cure control and cause. Cognitive representation was formed in parallel with the emotional representation. Emotional representations of feeling can be triggered by illness, for example, the diagnosis of chronic diseases can lead to anxiety or depression [6]. DM disease can have an impact on quality of life. The illness and the treatment had been undergone by a DM patient may affected the functional, psychological and social health and well-being of DM patients. It was can also affected the quality of life of DM patients [7].

Based on the phenomenon above, researchers want to conduct further research about the relationship between the emotional distress with quality of life of patients with T2DM in Meranti island regency hospital.

2. Materials and Methods

The research was a cross sectional design. Patient data collection was conducted prospectively who was underwent outpatient treatment in Meranti island regency hospital in period February-April 2017. The sample size in this study was determined based on epiinfo. The sample size was calculated as followed:

$$n = [DEFF * Np(1 - p)] / [(d^2/Z^2(1 - \alpha/2 * (N - 1) + p * (-p))]$$

Population size (N)	: 100
Hypothesized % (p)	: 50%+/-5
Confidence limits as % of 100(absolute +/- %)(d)	: 5%
Design effect (for cluster surveys- $DEFF$)	: 1

Table 1. Number of sample based on confidence level

Confidence level %	Sampel size
95%	80
80%	63
90%	74
97%	83
99%	88
99.9%	92
99.99%	94

The 95% confidence level results in a sample of 80 people [8].

The inclusion criterias in this study were patients with T2DM ICD No E11.00, E11.2, E11.3, E11.31, E11.32, E11.33, and aged over 18 years old. The exclusion criteria were T2DM patients underwent inpatient treatment at Meranti island regency hospital during the period of February-April 2017.

This study used cross sectional design. Diabetes Distress Scale (DDS) was used to measure patients emotional distress, and European Quality of life-5 Dimensions (EQ-5D) was used to measure patients quality of life.

The DDS consist 17 questions in 4 domains, emotional burden, physician distress, regiment distress, and interpersonal distress. Assessment was done by summing up the patient responses on the appropriate statements and divided it with the number of statements that exist in the domain [9].

Table 2. DDS questionnaire

No.	Domains	Question
1.	Emotional burden	7, 6, 9, 17, 8
2.	Physician distress	11, 12, 13, 4
3.	Regiment distress	14, 15, 10, 16, 5
4.	Interpersonal distress	3, 2, 1
Total		17

The EQ-5D questionnaire consist of 6 items covering 5 health dimensions: mobility, self-care, regular activity, pain/discomfort, and anxiety/depression, plus a global question to assess public health conditions [10]. Each dimension has 3 levels of assessment, which are no problem (value 1), some problems (value 2) and severe problem (value 3). The measurement result was the value of each dimension with a certain calculation was converted to EQ-5D index with the lowest value of -0.594 and the highest 1. The second part of EQ-5D contain Visual Analogue Scale (VAS) which to describe the subject perception about their quality of life by using the numeric scale 0 to 100. Which 0 is the lowest and 100 is the highest [11].

Univariate analysis used proportion or average value. The bivariate analysis used the linear regression, Mann-Whitney test for two-group data and Kruskal-Wallis test for three groups of data. Multivariate analysis used multiple linear regression test. This study received ethical approval from the Research Ethics Committee of Universitas Ahmad Dahlan.

3. Results and Discussion

Characteristics of patients with T2DM in Meranti island regency hospital can be seen in Table 3.

Table 3. Patient distribution

Category / characteristics	Total (n = 80)
Gender (%)	
Male	28 (35 %)
Women	52 (65 %)
Mean age (SD), year	57.41 (1.017)
Education (%)	
Lower education	54 (67.5%)
Higher education	26 (32.5%)
Employment (%)	
Unemployed	32 (40%)
Employed	48 (60%)
Income	
< Rp. 2.200.000	58 (72.5%)
> Rp. 2.200.000	22 (27.5%)
Marital status (%)	
Married	67 (83.8%)
Single/widow/divorced	13 (16.3%)
Family history (%)	
Yes	25 (31.3%)
No	55 (68.8%)
Type of treatment (%)	
Insulin	9 (11.3%)
Oral	65 (81.3%)
Insulin and oral combination	6 (7.5%)
Mean duration / duration of treatment of T2DM (SD), year	2.56 (0.194)
Companion disease (%)	
Microvascular	34 (42.5%)
Macrovascular	41 (51.3%)
Microvascular dan macrovascular	5 (6.3%)
Mean duration / duration of illness T2DM (SD), year	4.82 (0.576)

It showed that the incidence of T2DM occurred in women (65%) than in men (35%). It can be concluded that more women suffer from T2DM than men. This data was in line with previous research [12] in which the greater number of women was 53.3% and males 46.7%. Description of statistical emotional distress can be seen in Table 4. Based on the table, it can be seen that the mean $\pm$ SD result of DDS questionnaire measurement based on 4 domains. Based the mean result in 4 domains can be seen that the regiment distress was the largest which 3.222 ± 0.75 , and interpersonal distress was the smallest which 2.529 ± 0.859 . In the previous research reported that caregivers who was caring for a mentally impaired elder, who had been providing care for an extended time, and who had low social support was at high risk for psychological distress or depression [13].

Table 4. Statistical description emotional distress based on DDS

Domain	Mean	SD
Emotional burden	2.985	0.678
Physician distress	2.650	0.801
Regiment distress	3.222	0.750
Interpersonal distress	2.529	0.859

Analysis between characteristics with emotional distress patient in Table 5. Linear regression showed no significant relationship between characteristics with emotional distress (p value > 0.05).

Analysis results between characteristics and quality of life in Table 6. Linear regression showed no significant relationship between characteristics with quality of life (p value > 0.05).

Table 5. Analysis between characteristics and patients emotional distress

Characteristic	Emosional distress (DDS)							
	Emotional burden		Physician distres		Regimen distress		Interpersonal disstres	
	x $\pm$ SD	p value	x $\pm$ SD	p value	x $\pm$ SD	p value	x $\pm$ SD	p value
Gender (n)								
Male (28)	3.05 $\pm$ 0.648	0.553	2.830 $\pm$ 0.778	0.087	3.264 $\pm$ 0.824	0.367	2.582 $\pm$ 0.827	0.621
Women (52)	2.95 $\pm$ 0.697		2.55 $\pm$ 0.803		3.200 $\pm$ 0.715		2.500 $\pm$ 0.883	
Education (n)								
Lower education (54)	3.092 $\pm$ 0.729	0.015*	2.652 $\pm$ 0.788	0.840	3.248 $\pm$ 0.771	0.757	2.55 $\pm$ 0.919	0.697
Higher education (26)	2.761 $\pm$ 0.496		2.643 $\pm$ 0.843		3.169 $\pm$ 0.717		2.485 $\pm$ 0.734	
Employment (n)								
Unemployed (32)	3.012 $\pm$ 0.730	0.550	2.726 $\pm$ 0.833	0.533	3.312 $\pm$ 0.675	0.312	2.456 $\pm$ 0.562	0.793
Employed (48)	2.966 $\pm$ 0.647		2.598 $\pm$ 0.783		3.162 $\pm$ 0.797		2.577 $\pm$ 1.013	
Income (n)								
< Rp. 2.200.000 (58)	3.017 $\pm$ 0.705	0.684	2.599 $\pm$ 0.766	0.241	3.162 $\pm$ 0.761	0.159	2.575 $\pm$ 0.919	0.564
> Rp. 2.200.000 (22)	2.900 $\pm$ 0.607		2.783 $\pm$ 0.890		3.381 $\pm$ 0.711		2.404 $\pm$ 0.678	
Family history (n)								
Yes (25)	2.928 $\pm$ 0.624	0.584	2.550 $\pm$ 0.930	0.196	3.056 $\pm$ 0.751	0.066	2.516 $\pm$ 0.927	0.698
No (55)	3.011 $\pm$ 0.705		2.695 $\pm$ 0.740		3.298 $\pm$ 0.744		2.534 $\pm$ 0.835	
Marital status (n)								
Married (67)	2.994 $\pm$ 0.717	0.679	2.627 $\pm$ 0.753	0.927	3.164 $\pm$ 0.735	0.257	2.495 $\pm$ 0.761	0.921
Single/widow/divorced (13)	2.938 $\pm$ 0.435		2.769 $\pm$ 1.043		3.523 $\pm$ 0.785		2.700 $\pm$ 1.279	
Type of treatment (n)								
Insulin (9)	2.733 $\pm$ 0.547		2.444 $\pm$ 1.333		3.067 $\pm$ 0.959		2.422 $\pm$ 1.337	
Oral (65)	3.003 $\pm$ 0.621	0.328	2.665 $\pm$ 0.742	0.291	3.264 $\pm$ 0.730	0.404	2.533 $\pm$ 0.806	0.543
Insulin and Oral combinations (6)	3.166 $\pm$ 1.298		2.791 $\pm$ 0.368		3.000 $\pm$ 0.681		2.633 $\pm$ 0.677	
Companion disease (n)								
Microvascular (34)	2.947 $\pm$ 0.816		2.573 $\pm$ 0.796		3.170 $\pm$ 0.831		2.423 $\pm$ 0.751	
Macrovascular (41)	3.053 $\pm$ 0.567	0.330	2.640 $\pm$ 0.786	0.290	3.209 $\pm$ 0.709	0.310	2.539 $\pm$ 0.924	0.198
Microvascular and macrovascular (5)	2.680 $\pm$ 0.414		3.250 $\pm$ 0.866		3.680 $\pm$ 0.303		3.160 $\pm$ 0.890	

*Mann Whitney significant p value < 0.05

Table 6. Analysis between characteristics and patients quality of life

Characteristics	Index x±SD	Quality of life (EQ-5D)		VAS	p value
		p value	x±SD		
Gender (n)					
Male (28)	0.767±0.261	0.714	81.07±16.852		0.520
Women (52)	0.751±0.287		76.92±22.011		
Education (n)					
Lower education (54)	0.720±0.298	0.059	72.78±21.405		0.000*
Higher education (26)	0.832±0.212		90.00±11.314		
Employment (n)					
Unemployed (32)	0.836±0.195	0.040*	83.75±18.272		0.030*
Employed (48)	0.704±0.311		74.79±21.036		
Income (n)					
< Rp. 2.200.000 (58)	0.739±0.293	0.464	75.34±21.620		0.030*
> Rp. 2.200.000 (22)	0.802±0.227		86.36±13.988		
Family history (n)					
Yes (25)	0.684±0.360	0.429	78.80±21.664		0.794
No (55)	0.789±0.225		78.18±19.916		
Marital status (n)					
Married (67)	0.789±0.235	0.092	79.70±19.304		0.295
Single/widow/divorced (13)	0.590±0.406		71.54±24.781		
Type of treatment (n)					
Insulin (9)	0.657±0.404	0.628	64.44±31.269		0.267
Oral (65)	0.766±0.254		80.77±17.793		
Insulin and Oral combinations (6)	0.799±0.319		73.33±21.602		
Companion disease (n)					
Microvascular (34)	0.834±0.203	0.222	78.24±21.387		0.504
Macrovascular (41)	0.700±0.308		79.51±19.615		
Microvascular and macrovascular (5)	0.696±0.365		70.00±21.213		

*Mann Whitney significant p value < 0.05

Index = part of the EQ-5D questionnaire

VAS = Visual analog scale, part of the EQ-5D questionnaire

The result of multiple linear regression can be seen in Table 7. In this study, variable employment affected the index, then the correlation relationship showed the weak negative (r -0.234) and $p < 0.05$. Coefficient of determination showed the value of 0.045, means that employment can contribute the quality of life of 4.5%, the rest was explained by other factors. This means that the correlation of employment with quality of life was inversely proportional, meaning that employment can lead a decreasing score of quality of life. This data was in line with previous research [14] which employment affected the quality of life.

Table 7. Multiple linear regression analysis emotional distress with quality of life

Dependent variable	Independent variable	Coefficient of determination (R^2)	Correlation relation (r)	p value
Index	Employment	0.045	-0.234	0.002*
	Interpersonal distress	0.094	-0.321	
	Education	0.111	0.399	
VAS	Employment	0.046	-0.217	0.000**
	Emotional burden	0.063	-0.321	

* multiple linear regression p value < 0.05

** multiple linear regression p value < 0.01

Index = part of the EQ-5D questionnaire

VAS = Visual analog scale, part of the EQ-5D questionnaire

Emotional distress may affect the index on the interpersonal distress. It showed from the negative correlation ($r = -0.321$) and $p < 0.05$. Coefficient determination showed 0.094, which interpersonal distress contributed the quality of life of 9.4%, and the rest was explained by other factors. It can be concluded that the emotional correlation to quality of life was inversely proportional. The higher the emotional the worse the quality of life. In the previous research reported that a significant relationship between depression and the quality of life of respondents. The emergence of depression caused a significant decrease in the quality of life of DM patients [15].

Other variable, education can affect the VAS, with the correlation value ($r = 0.399$) and $p < 0.01$. Coefficient determination showed 0.111, which education contributed the quality of life by 11.1%, which means that the higher the education was better the quality of life. This was in line with the previous research [14], patients who had education above senior high school (lectures), the quality of life was better than the subject of research up to high school education. Education level was significantly related to quality of life [16]. The theory of behavioral science in the Health Educational Planning Diagnostic Approach states that quality of life was a way of assessing a person's health condition, in which health itself expressed physically, mentally and socially. Education was one of the predisposing aspects in which this predisposing was one that affect the behaviour of a person, so the level of education was one of a lot of factors that can be contributed to the quality of life of the patient. Another important factor was the non-behavioral factor in which it consists of things related to physiology, pharmacology, genetics and the patient's environment. Therefore, the result of research indicated that there was no correlation between level of education with quality of life was caused by very small association coefficient which can not significantly describe the relationship between them and it was possible there are other factors that have more dominant relation to quality of life [17].

In the employment variable, the value of the correlation of the employment indicated a weak negative correlation value (-0.217) $p < 0.01$, it showed that employment can decrease the quality of life. The value of coefficient determination indicated the value of 0.046, meaning that the employment contributed to the quality of life of 4.6%, the rest was explained by other factors. Emotional distress can affect the VAS on the emotional burden, with the correlation value showed a weak negative correlation ($r = -0.321$) and $p < 0.001$. Coefficient determination showed 0.063, it showed that emotional burden can affect the quality of life by 6.3%. It can be concluded that the emotional distress has an inversely proportional correlation with quality of life. The higher the emotional distress, the worse the quality of life.

Based on previous research [18], family support was one of the most important element in DM patients, because the first and the most frequent interaction was the patient with the closest family. The presence of interpersonal support was very helpful for patients with T2DM to increase the confidence in their ability to do self-care [19]. Patients with good interpersonal support was had a sense of security and comfort so that will grow a sense of attention to themselves and increase the motivation to perform a disease management. This condition was aimed to prevent the emergence of stress in patients with T2DM. it can be understood if people with T2DM experience stress, and it will affect the body function. Stress was trigger to increase the cortisol in the body which will affect the increasing level of blood glucose by increasing gluconeogenesis, fatty and protein catabolism. In addition, cortisol was also interfere with the uptake of glucose by body cells that can affect blood glucose levels. This condition can cause an imbalance level of blood glucose and if this happens for a long time then the risk of complications will increase. In the end it can affect the quality of life of T2DM patients.

4. Conclusion

Employment and education was factors that affected the quality of life. High emotional distress can degraded the quality of life.

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