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

I N Faridah¹, D A Perwitasari¹, M Pusfita², H Jasman¹
¹ Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta, Indonesia
² Meranti Island Regency Hospital, Indonesia

Email: imaniar_apt@yahoo.com

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 (r0.334) 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 and 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:

\[ n = \frac{\text{DEFF} \times N \times (1 - p)}{(d^2/Z^2 \times (1 - \alpha/2) \times (N - 1) + p \times (-p))} \]

Population size \( (N) \) : 100
Hypothesized % \( (p) \) : 50\% \pm 5
Confidence limits as % of 100(absolute \pm \%) \( (d) \) : 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 ± 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 | Emotional burden | Physician distress | Regiment distress | Interpersonal distress |
| | x ± SD | $p$ value | x ± SD | $p$ value | x ± SD | $p$ value | x ± SD | $p$ value |
| Gender (n) |  |  |  |  |  |  |  |  |
| Male (28) | 3.05±0.648 | 0.553 | 2.830±0.778 | 0.087 | 3.264±0.824 | 0.367 | 2.582±0.827 | 0.621 |
| Women (52) | 2.95±0.697 | 2.55±0.803 | 3.00±0.715 | 2.50±0.883 |
| Education (n) |  |  |  |  |  |  |  |  |
| Lower education (54) | 3.092±0.729 | 0.015* | 2.652±0.788 | 0.840 | 3.248±0.771 | 0.757 | 2.54±0.919 | 0.697 |
| Higher education (26) | 2.761±0.496 | 2.643±0.843 | 3.169±0.717 | 2.485±0.734 |
| Employment (n) |  |  |  |  |  |  |  |  |
| Unemployed (32) | 3.012±0.730 | 0.550 | 2.726±0.833 | 0.333 | 3.121±0.675 | 0.312 | 2.456±0.562 | 0.793 |
| Employed (48) | 2.96±0.647 | 2.59±0.783 | 3.162±0.789 | 2.577±0.103 |
| Income (n) |  |  |  |  |  |  |  |  |
| < Rp. 2.200.000 (58) | 3.017±0.705 | 0.684 | 2.59±0.766 | 0.241 | 3.162±0.761 | 0.159 | 2.575±0.919 | 0.564 |
| > Rp. 2.200.000 (22) | 2.900±0.607 | 2.78±0.890 | 3.381±0.711 | 2.404±0.678 |
| Family history (n) |  |  |  |  |  |  |  |  |
| Yes (25) | 2.928±0.624 | 0.584 | 2.550±0.930 | 0.196 | 3.056±0.751 | 0.066 | 2.51±0.927 | 0.698 |
| No (55) | 3.01±0.705 | 2.69±0.740 | 3.29±0.744 | 2.53±0.835 |
| Marital status (n) |  |  |  |  |  |  |  |  |
| Married (67) | 2.994±0.717 | 0.679 | 2.627±0.753 | 0.927 | 3.16±0.735 | 0.257 | 2.49±0.761 | 0.921 |
| Single/widow/divorced (13) | 2.93±0.435 | 2.769±0.104 | 3.52±0.785 | 2.70±0.127 |
| Type of treatment (n) |  |  |  |  |  |  |  |  |
| Oral (65) | 3.00±0.621 | 0.328 | 2.66±0.742 | 0.291 | 3.26±0.730 | 0.404 | 2.53±0.806 | 0.543 |
| Oral (65) | 3.16±1.298 | 2.79±0.368 | 3.00±0.681 | 2.63±0.677 |
| Companion disease (n) |  |  |  |  |  |  |  |  |
| Microvascular (34) | 2.947±0.816 |  | 2.57±0.796 |  | 3.17±0.831 |  | 2.42±0.751 |
| Macrovascular (41) | 3.05±0.567 | 0.330 | 2.64±0.786 | 0.290 | 3.209±0.709 | 0.310 | 2.53±0.924 | 0.198 |
| Microvascular and macrovascular (5) | 2.68±0.414 | 3.25±0.866 | 3.68±0.303 | 3.16±0.890 |

*Mann Whitney significant $p$ value < 0.05
### Table 6. Analysis between characteristics and patients quality of life

| Characteristics          | Index | Quality of life (EQ-5D) | VAS | |
|--------------------------|-------|-------------------------|-----|---|
|                         | x±SD  | p value                 | x±SD | p value |
| 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)   | 0.803±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 (R²) | 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.
References
[1] ADA 2015 Classification and diagnosis of diabetes Diabetes care 38 8-16.
[2] PERKENI 2015 Konsensus Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia (Jakarta: Pb Perkeni).
[3] Kemenkes 2014 Pusat Data dan Informasi (Jakarta: Kementerian Kesehatan RI).
[4] DINKES 2010 Profil Kesehatan Provinsi Riau (Pekanbaru: Dinas Kesehatan Provinsi Riau)
[5] Jones CJ, Smith HE and Llewellyn CD 2016 A systematic review of the effectiveness of interventions using the common sense self-regulatory model to improve adherence behaviours J. of Health Psychol. 21 2709-2724.
[6] Brandes K and Mullan B 2014 Can the common-sense model predict adherence in chronically ill patients? A meta-analysis Health Psychology Review 8 129-153.
[7] Azila A A 2016 Gambaran kualitas hidup pasien diabetes mellitus tipe 2 di poli interna RSD dr. Soebandi Jember Skripsi Program Studi Ilmu Keperawatan Universitas Jember.
[8] Dea A G, Sullivan K M and Soe M M 2013 OpenEpi: source epidemiologic statistics for public health. accessed 30/10/2016 from www.OpenEpi.com.
[9] Fisher L, Hessler D M, Polonsky W H and Mullan J 2012 When is diabetes distress clinically meaningful? Diabetes care 35 259-264.
[10] Zeng Y C, Ching S S and Loke A Y 2010 Quality of life measurement in women with cervical cancer: implications for Chinese cervical cancer survivors Health and quality of life outcomes 8 30.
[11] Harmaini F 2006 Uji keandalan dan kesahihan formulir European Quality of Life-5 Dimensions (EQ-5D) untuk mengukur kualitas hidup terkait kesehatan pada usia lanjut di RSUPNCM Tesis Fakultas Kedokteran Universitas Indonesia.
[12] Witasari U, Rahmawaty S and Zulaekah S 2009 Hubungan tingkat pengetahuan, asupan karbohidrat dan serat dengan pengendalian kadar glukosa darah pada penderita diabetes melitus tipe 2 Jurnal Penelitian Sains & Teknologi 10 130-138.
[13] Baille V, Norbeck J S and Barnes L E A 1988 Stress, social support, and psychological distress of family caregivers of the elderly Nurs. Res. 37 217-222.
[14] Sari R M, Thobari J A and Andayani T M 2011 Evaluation quality of life of type 2 diabetic patients with oral antidiabetic therapy at ambulatory clinic in RSUP Dr. Sardjito Journal of Management and Pharmacy Practice 1 35-42.
[15] Rantung J, Yetti K and Herawati T 2015 Hubungan self-care dengan kualitas hidup pasien diabetes mellitus (DM) di persatuan diabetes indonesia (Persadia) Cabang Cimahi Jurnal Skolastik Keperawatan 1.
[16] Chiang C K, Peng Y S, Chiang S S, Yang C S, He Y H, Hung K Y, Wu K D, Wu M S, Fang C C and Tsai T J 2004 Health-related quality of life of hemodialysis patients in Taiwan: a multicenter study Blood purification 22 490-498.
[17] Green L W, Kreuter M W, Deeds S G, Partridge K B and Bartlett E 2002 Health Educational Planning: A diagnostic Approach (California: Mayfield Publishing).
[18] Pratita N D 2012 Hubungan dukungan pasangan dan health locus of control dengan kepatuhan dalam menjalani proses pengobatan pada penderita diabetes mellitus tipe-2 CALYPTRA 1 1-24.
[19] Antari G, Rasdini I and Triyani G 2012 Besar pengaruh dukungan sosial terhadap kualitas hidup pada penderita diabetes melitus tipe 2 di Poliklinik Interna RSUP Sanglah Karya Tulis Ilmiah Strata satu.