Relationship between perception with the quality of life of T2DM patients in Dok II Jayapura Hospital

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Abstract. Diabetes mellitus disease is one of the chronic diseases which can cause a fatal risk if its management is not appropriate. The purpose of this study was to determine the relationship between perception and quality of life in Dok II Jayapura hospital. This study used an observational research design with cross sectional approach with prospective sampling in diabetic patients in internal disease policemen who were underwent outpatient treatment at Dok II Jayapura hospital. Research instruments used EQ-5D (European Quality-5 Dimension) and B-IPQ (Brief Illness Perception Questionare). Data analysis used was univariate analysis by using percentage or mean value, bivariate using T-test or Mann-Whitney test, and multivariate using multiple linear regression. There were 80 T2DM patients who met the inclusion criteria. Based on patient demographic data, there were 29 people (36.6%) male patients and 51 people (63.8%) female patients, with mean age of patient (55.79±10.52) year. Perception has correlation with quality of life influenced by index value on treatment control (6.73±1.475) and emotional response (3.11±2.199) and by visual analog scale on understanding (5.99±1.587), duration (6.50±2.968), and personal controls (6.20±1.641). Based on the results obtained to improve the quality of life of T2DM patients that is on the index value on the control of treatment and emotional response and on visual analog scale on the understanding, duration and personal control should be changed so that the quality of life of patients increases. The family history, social status and type of treatment factors also affect the quality of life.

Keywords: diabetes mellitus, perception, quality of life

1. Introduction
Diabetes mellitus (DM) is one of the most chronic illnesses in the world. According to research conducted by the World Health Organization [1], is estimated to reach 171 million people in 2000 and this figure will rise to 366 million in 2030. Meanwhile, Indonesia is a country that was ranked fourth, with total patient about 8.4 million people in 2000 and will increase to 21.3 million people by 2030. The highest prevalence of Diabetes Mellitus is found in Riau Province (1.0%), West Kalimantan (0.8%) and Papua (0.8%) [2].

B-IPQ (Brief-illness perception questionare) is a questionnaire designed to facilitate asessment used by patients to describe the patient's perception of the disease [3]. Therefore we expect that private control is a higher confidence can be measured by the Brief-Illness Perception Questionare and also can be associated with a better metabolic control.
According to previous research, which encourages the necessity of measuring the quality of life, especially in people with diabetes mellitus is because the quality of life is one of the main goals of care, if blood sugar levels can be controlled properly, then the physical complaints due to acute and chronic complications can be minimized or prevented. In addition, low quality of life and psychological problems can make heavier metabolic disorders, either directly through hormonal stress reactions, or indirectly through complications [4]. Knowledge of the patient's condition, the condition of the patient's illness, and family support can affect patient compliance behavior and then can affect the output of clinic patients [5]. Family knowledge and support are two main factors that great affect the adherence of diabetes mellitus patients in management [6].

2. Materials and Methods

The research was conducted prospectively at Dok II Jayapura hospital. This study was use a study design cross-sectional, prospective data collection on patients in Dok II Jayapura hospital. Population diabetes mellitus patients who do outpatient in polyclinic of disease in Dok II Jayapura hospital. The sample is diabetes mellitus patient who participated in the study, which corresponds to the inclusion criteria listed below man and woman patients included in the category of adults aged ≥ 18 years exclusion criteria diabetic patients underwent outpatient treatment at Dok II Jayapura hospital. Diabetes mellitus sufferers without and with complications. Sample is done by doing a screening through the laboratory. The selected sample is diabetes mellitus patient out patient's address recorded and contacted, then seen suitability with inclusion criteria.

In this study the research used the formula for calculating the large sample of diabetes mellitus patients in Dok II Jayapura hospital the sample size N=Population size of patient DM = 100 P = Hypothesis of % frequency of result factors in population if not stated otherwise = 50% D = Trust limit as % of 100 (absolute +/- %) = 5% DEFF = Design effect (for survey-Deff Cluster) =1 With the results of the level of 95%, the number of patients with DM obtained 80 samples of the population of respondents with diabetes mellitus in Dok II Jayapura hospital is 100. Data perceptions, behavior and self-management support was used a structured questionnaire that has been validated. The perception questionnaire will be filled by DM patients. The same questionnaire was given to the patient to see whether there is influence questionnaires given to adherence and self-management.

Research procedure is used questionnaire BIPQ and EQ-5D. BIPQ contains 9 questions, of which 1 item is a question that is answered by sequencing the main factors causing the disease and 8 other questions representing 8 domains (consequence domain, duration domain of perception, personal control domain, medication control domain, identity domain, domain of concern, domain understanding, and domain emotional response). The quality of life (EQ-5D) questionnaire of the patient is said to be good if the index is close to 1. Visual Analog Scale (VAS) is said to be good if its value is close to 100.

3. Result and discussion

From the research conducted, 80 patients with T2DM with complications meet the inclusion criteria. The results of univariate analysis describe the distribution of respondents including age, sex, social status, education, occupation, income, disease length, length of treatment, and history of disease. Characteristic description of respondents can be seen in Table 1.
Table 1. Characteristics of patients T2DM Dok II Jayapura hospital

| Research Characteristics (n=80) | X±SD |
|--------------------------------|------|
| Age (Year)                     | 55.79±10.52 |
| Duration of Treatment          | 5.25±4.88  |
| Long Disease                   | 6.49±5.46  |

| Research characteristics (n=80) | N(%) |
|--------------------------------|------|
| Gender                         |      |
| A. Man                         | 29 (36.3) |
| B. Women                       | 51 (63.8) |
| Education                      |      |
| A. Low education               | 13 (16.3) |
| B. Higher education            | 67 (83.8) |
| Work                           |      |
| A. Work                        | 30 (37.5) |
| B. Does not work               | 50 (62.5) |
| Income                         |      |
| A. Low Income                  | 28 (35.0) |
| B. High Income                 | 52 (65.0) |
| Type of Treatment               |      |
| Monotherapy:                   |      |
| A. Oral                        | 65 (81.3) |
| B. Insulin                     |      |
| Combination:                   |      |
| A. Insulin-Insulin             | 15 (18.8) |
| B. Oral-Insulin                |      |
| Family history                 |      |
| A. There is                    | 4 (5.0) |
| B. There is no                 | 76 (95.0) |
| Social status                  |      |
| A. Married                     | 77 (96.3) |
| B. Single (Not Married, Widowed/Widowed) | 3 (3.8) |
| Comorbidities                  |      |
| A. Microvascular               | 4 (5.0) |
| B. Macrovascular               | 65 (81.3) |
| C. No comorbidities            | 11 (13.8) |

3.1. Characteristics of respondents Dok II Jayapura

3.1.1. Characteristic description of respondents

In this research, the mean result (mean±SD) of respondent age is 55.79±10.52 year based on the data known to respondent aged 50 years and above more that suffer T2DM. This is in accordance with previous research [7], where the prevalence of DM will increase with age due to the continued age of insulin expenditure in the pancreas will also be reduced. In another study said that the frequency of diabetics most at the age of 51-60 years [8]. According to previous research, as age increases, the increased incidence of diabetes results from hormonal changes that play a role in metabolism, reproduction and other bodily functions. Female gender (63.8%) was higher than male gender (36.3%) [9]. This is in line with the results of reports of previous studies in which patients with female sex T2DM were more dominant than men [9, 10]. Women are more at risk of diabetes because physically women are more likely to experience increased body mass index. The monthly cycles syndrome (Pre Menstrual Syndrome) and post menopause that make the distribution of body fat become easily accumulated due to hormonal process, so that women are more at risk of suffering T2DM [11]. But according to other studies the data show only the characteristics that do not mean women are more vulnerable to diabetes than men [12], all have the same risk. According to previous research, one of the risk factors of diabetes is heredity, lifestyle (diet, etc.) and age [3].

Based on the last education category it can be seen that majority of respondents have low education level (83.8%) than respondents who have high education level (16.3%). This is in line with studies which suggest that education levels have an effect on the incidence of diabetes mellitus type 2 disease [11, 13]. The higher a person's level of education means there is a better chance of a person's knowledge in preventing the occurrence of illness including T2DM. Characteristics of respondents based on the work found the results of respondents who do not work (62.5%) more dominant than the
respondents who work (37.5%). This is because people who do not work plus the elderly and lightweight activities that have a higher risk factor for diabetes mellitus. This is supported by research conducted on 13 European countries it is said that the accumulation of physical activity daily is a major factor determining insulin sensitivity [14]. So the less activity the insulin sensitivity will decrease, the consequence will be a big risk to trigger the occurrence of T2DM. Based on the table, the largest percentage of respondents who suffered from T2DM were respondents with high income (65.0%) compared with respondents with low income (35.0%). The same results were also shown in a study conducted income may be related to the level and lifestyle of a person, so it is feared will affect his health [15]. T2DM therapy in this study was divided into 2 categories: single therapy/monotherapy (therapy of oral and insulin use) and combination (oral-oral, insulin-insulin, and oral-insulin combination). Based on the table obtained the largest (81.3%) of respondents using single therapy (monotherapy) and for the use of therapy in combination obtained the lowest results (18.8%) of respondents using combination therapy. This shows that T2DM patients in Dok II Jayapura Hospital mostly get more monotherapy therapy. The results of the previous study mentioned that patients who suffer T2DM over 5 years will experience various complications of disease that can aggravate the condition of the patient [16].

Based on the results of the study, patients with mean (mean±SD) treatment duration of 5.25±4.88 years. This suggests that T2DM patients in Dok II Jayapura Hospital are mostly those who have long been on diabetes mellitus type 2 treatment. Duration of optimal drug treatment treatment will provide the success of therapy in the treatment of all chronic diseases and improve the quality of life of patients. In diabetes mellitus, adherence to medication affects the success of therapy. Based on the table, which has no family history has the largest percentage (95.0%) and who has a family history has the smallest percentage (5.0%). According to the previous research all have the same risk, one of the risk factors of diabetes is heredity, lifestyle (diet, etc.) [3].

3.1.2. Perception
Assessment of the perception of disease in this study using a perception questionnaire or The Brief-Illness Perception Questionnaire (BIPQ). The highest mean value of perception of disease is found in the Consequence domain (7.63±2.52) and the lowest is in the emotional response domain (3.11±2.19). The average of BIPQ can be seen from Table 2.

| Domain            | Mean  | SD   |
|-------------------|-------|------|
| Consequences      | 7.63  | 2.52 |
| Duration Perception | 6.50  | 2.96 |
| Personal Controls | 6.20  | 1.64 |
| Treatment Control | 6.73  | 1.47 |
| Identity          | 4.80  | 1.61 |
| Worries           | 3.34  | 1.82 |
| Understanding     | 5.99  | 1.58 |
| Emotional Response| 3.11  | 2.19 |

Question 9 is an open question that will illustrate the three main factors causing diabetes mellitus type 2 disease. Based on the results of analysis in this study many factors that menajdi causes diabetes mellitus type 2 disease. After collecting the data and analyzed using descriptive analysis, the most answer to represent 3 main answer cause the first diabetes mellitus type 2 got result equal to 96.3% respondent answer because dietary habit (like sweet food, eat rice, and like oily food and fat) , The second result was 71.3% respondents answered because they like to drink sweet (like sweet drinks like tea, coffee, milk and fast drinks), and the third result is 50.0% of respondents answered because of stress, Thoughts and job matters make a lot of thought and stress. Other descriptive analysis results can be seen in Table 3.
Table 3. Descriptive analysis of the main factors causing T2DM disease

| Main factor      | Answer 1 (%) | Answer 2 (%) | Answer 3 (%) |
|------------------|--------------|--------------|--------------|
| Dietary habit    | 96.3         | 1.3          | -            |
| The drinking pattern | -        | 71.3         | 15.0         |
| Stress           | -            | 13.8         | 50.0         |

Based on the answers above factors causing diabetes mellitus type 2 disease that has been traced based on the respondents’ answers, has been in accordance with the description in [17]. Other factors causing diabetes mellitus type 2 described in [17] are age (with increasing age, the occurrence of glucose intolerance will also increase due to decreased physiological function of the body), history of women who have experienced gestational diabetes mellitus, patients with a history of dyslipidemia, cardiovascular, and patients with polycystic ovary syndrome (PCOS).

3.1.3. Quality of life

In this study conducted a univariate analysis which aims to see the picture of the quality of life of T2DM patients using EQ-5D questionnaire. From the Table 4 can be seen that the average quality of life index of patients T2DM 0.920±0.202. The quality of life of the patient is said to be good if the index approaches the value 1. While the mean VAS of patients T2DM is 65.86±9.518. VAS is said to be good if its value is close to 100.

Table 4. The average distribution of the EQ-5D questionnaire.

| EQ-5D | Mean | SD  |
|-------|------|-----|
| Index | 0.920| 0.202|
| VAS   | 65.86| 9.518|

3.2. Bivariate analysis

3.2.1. The relationship of respondent characteristics with perception (BIPQ)

In this study bivariate analysis to determine the significance of the relationship characteristics of respondents with perceptions (BIPQ) respondents about the disease. The first step is to test the data normality. In the normality test obtained the results of distribution of data that is not normally distributed. Based on the results of the bivariate analysis in this study using the Mann-Whitney test. Based on the result of linear regression analysis, there was a significant correlation between age and patient perception about disease seen from p=0.012, p=0.000, p=0.048. The results of this study have been in accordance with previous research, age is one of the characteristics that affect a person's perception of the disease [18]. According to previous research age is an individual characteristic that underlies the occurrence of certain behaviors [19]. The more mature a person will adjust his behavior towards life as well as related to health conditions. Bivariate analysis between relationship of gender characteristic with perception about disease got result that sex genetic characteristic do not have significant relation to entire domain of perception, it seen from p>0.05. Bivariate analysis between the relationship between education characteristic and perception about the disease resulted that the characteristics of education did not have significant relation to the whole domain of perception, it is seen from p> 0.05.

The result of bivariate analysis of work characteristic group with perception about the disease resulted in significant relationship to personal control domain (p=0.003). In the private control domain, the working group of respondents (5.47±1.67) had a better understanding of personal control than the unemployed group (6.64±1.46). Good lifestyle and routine physical activity allow someone to have a better level of health [15]. Perception on the job can affect the perception of the disease, people who do not work tend to have a positive perception because they can perform activities as usual and rarely have complaints related to symptoms of the disease he suffered. The existence of work makes a
person busy so they forget about his illness [20, 21]. The result of relation between income with private control domain (p=0.012). In the private control domain, high income groups (6.58±1.47) had a more positive view of the consequences of the disease than the low-income group (5.50±1.73). According to previous research, income will affect the expenditure on health costs. Someone with a low income will be difficult to get treatment because of limited costs, consequently received treatment becomes not optimal [22]. Less optimal treatment can worsen the condition of the patient, because the emergence of various complications that can inhibit daily activities. The existence of financial limitations causes the patient's perception of the disease to be negative. The result of the relationship between treatment type and domain of understanding (p=0.059). In the domain of understanding, the group with the type of monotherapy treatment (5.50±1.73) had a better understanding of the type of monotherapy treatment than the group with the type of combination treatment (6.73±1.43).

The results of this study also states that respondents better understand and more controlled blood sugar using the type of treatment in monotherapy than the type of combination treatment. The statistical results of diabetes in the United States also show similarities, where more patients are taking oral preparations than with insulin. The result of relation between family history with consequence domain (p=0.033), and emotional response (p=0.029). In the group consequences domain that did not have a higher family history (7.75±2.52) had a more positive outlook on the disease than the group with a lower family history (5.25±1.25). In the emotional response domain the group with no family history (3.00±2.17) had a more positive view of the disease than the group with a family history (5.25±1.70). This is in accordance with the study of that individuals with a family history of diabetes consider themselves at greater risk of developing diabetes, compared with those without a family history. The result of a relationship between social status and private control domain (p=0.037). In single person control domains the single group (4.00±1.73) had a more positive view of the disease than the married group (6.29±1.58). This is in accordance with the study of [23], in which respondents with married status are more likely to suffer from diabetes mellitus type 2. A married person has a heavier responsibility in terms of her role as a spouse than an unmarried one. Roles and responsibilities are the weight of this risk factor to the emergence of anxiety effect easy one person experiencing stress.

3.2.2. Relationship characteristics of respondents with quality of life (EQ-5D)

In this study conducted bivariate analyzes to determine the characteristics of the respondents significance relationship with quality of life (EQ-5D) of the respondents about the disease. The first step taken was to test the normality of the data. Normality test results obtained on the distribution of the data were not normally distributed. Based on the results of the bivariate analysis in this study using the test of Mann-Whitney.

In this study bivariate analysis to determine the significance of the relationship characteristics of respondents with quality of life (EQ-5D) respondents about the disease. The first step is to test the data normality. In the normality test obtained the results of distribution of data that is not normally distributed. Based on these results bivariate analysis in this study using Mann-Whitney test. Bivariate analysis between age relationship with quality of life found a significant relationship between age with quality of life seen from the value (p=0.007). The results of this study in accordance with previous research, where the prevalence of diabetes mellitus will increase with increasing age then the expenditure of insulin by the pancreas will also be reduced [7]. In another study, T2DM is the most common type of diabetes mellitus, which is about 90-95% of all people with diabetes mellitus and is more commonly experienced by adults over 40 years. This is because insulin retention in diabetes mellitus type 2 incline to increase in the elderly (46-65 years), in addition to the history of obesity and the presence of hereditary factors. Bivariate analysis between the relationship of sex with quality of life found the result that gender does not have significant relationship to quality of life, it is seen from the value p>0.05.

Bivariate analysis between the relationship of education with quality of life found that education has no significant relationship to quality of life, it is seen from the value p>0.05. Bivariate analysis between job relation with quality of life got result that work did not have significant relation to quality
of life, it is seen from value \( p > 0.05 \). Bivariate analysis between relation of income with quality of life earn result that earnings have no significant relation to quality of life, it is seen from value \( p > 0.05 \). Bivariate analysis between relation of type of treatment with quality of life got result that type of treatment did not have significant relation to quality of life, it is seen from \( p > 0.05 \). The result of bivariate analysis of group of family history characteristic with quality of life about got result of significant correlation to quality of life. Based on the result (\( p \text{ value}=0.025 \)) where (\( p \text{ value} < 0.05 \)) is in the visual analog scale (VAS) assessment. In the VAS the working group of respondents (75.00±5.77) had a better quality of life against the disease than the unemployed group (65.38±9.45). This is in accordance that individuals with a family history of diabetes consider themselves at greater risk of developing diabetes, compared with those without a family history. The result of bivariate analysis of social status characteristic group found a significant correlation to quality of life. The index (value \( p=0.000 \)) and VAS (\( p \text{ value}=0.001 \)). In the Index Value the married respondents group had a higher quality of life (0.95±0.12) than the single (0.35±0.48) and in the VAS group of married respondents had a higher quality of life (66.96±8.34) than the single group (45.00±5.77). This is in accordance with the study according to[40] suggests that both men and women, individuals with marital status or cohabitation have a higher quality of life. The influence of the marriage status associated with family support is the strongest indicator of having a positive impact on self-care in DM patients [17]. The result of bivariate analysis of the characteristics of comorbidities showed that there was a significant correlation to the quality of life. Based on the result of NI (\( p \text{ value}=0.000 \)) and VAS (\( p \text{ value}=0.024 \)) where with value \( p < 0.05 \). In the Index Values the respondents of macrovascular concomitant disease had a higher quality of life (0.96±0.11) than microvascular comorbidities (0.69±0.09) and no complications (0.74±0.30) And in the VAS of respondents in macrovascular concomitant disease had a higher quality of life (67.06±8.25) than in the accompanying microvascular disease group (55.00±12.91) and no complication (62.73±12.72).

This is consistent with studies acute and chronic complications in DM patients are serious [24], a complication that can occur in patients with type 2 diabetes is ischemic heart disease, stroke and neuropathy. The result of linear regression analysis showed significant correlation between perception of patient to disease with quality of life which can be seen in the perception of medication control value \( p=0.001 \), emotional response value \( p=0.010 \), understanding \( p \text{ value}=0.032 \), identity value \( p=0.006 \), and the duration value \( p=0.016 \). The significance value in the table above showed that the quality of life of T2DM patients will be influenced by perception. This is in accordance with previous study [25] which said that patient perception significantly affects the quality of life and adherence of patients in diabetics.

### 3.2.3. Perception relationship (BIPQ) with quality of life (EQ-5D)

The result of linear regression analysis showed a significant correlation between patient perception to disease with quality of life which can be seen on live quality domain at index value at treatment control with \( p=0.000 \) value and emotional response with \( p=0.001 \) and life quality domain VAS value at Understanding with value \( p=0.032 \), identity with value \( p=0.006 \), at personal control with value \( p=0.014 \) and at duration at value \( p=0.016 \). So the value of significance shows that the perception of T2DM patients will be influenced by the quality of life.

### 3.3. Multivariate analysis

#### 3.3.1. Multivariate analysis between the characteristics and the patient’s perception (BIPQ)

Based on the Table 5, it can be seen that there are some characteristics that are otherwise significant relationships with all domains on the questionnaire BIPQ. In BIPQ questionnaire reveal any significant differences; perception of the consequences of the characteristics of age, family history, social status and comorbidities; perespsi the duration of the employment, income, family history, social status and duration of disease. Perceptions of personal control of the characteristics of gender, education, occupation, income, duration of treatment, social status, and duration of illness. Perception of control treatment on the characteristics of age, education, family history, social status, and comorbidities. Perceptions of the identity of the characteristics of age and family history. Perception concerns about family history characteristics and comorbidities. Perception understanding of the
characteristics of this type of treatment and social status. Perceptions of emotional response to job characteristics, family history, and comorbidities. So that all variables have significant value is selected for inclusion into the multivariate analysis.

**Table 5.** Spearman correlation test between characteristics and respondents perception (BIPQ).

| Variable          | C    | PD   | PC   | CT   | I    | W    | U    | ER   |
|-------------------|------|------|------|------|------|------|------|------|
| Age               | 0.298| 0.097| -0.035| 0.280| -0.197| 0.076| 0.061| -0.084|
| Type              | 0.007*| 0.394| 0.758| 0.012*| 0.080*| 0.505| 0.593| 0.460 |
| Sex               | 0.115| -0.001| -0.153| 0.074| -0.101| -0.098| -0.069| -0.035|
| Education         | 0.059| -0.128| 0.193| 0.166| 0.014| -0.068| 0.082| -0.074|
| Job               | 0.603| 0.257| 0.086*| 0.142*| 0.900| 0.548| 0.470| 0.515 |
| Income            | 0.045| -0.172| 0.331| 0.084| 0.098| 0.071| 0.117| 0.187 |
| Family            | 0.692| 0.123*| 0.003*| 0.457| 0.387| 0.529| 0.302| 0.097*|
| Status            | -0.107| -0.198| 0.282| 0.120| 0.041| 0.112| 0.118| 0.088 |
| Social            | 0.345| 0.078*| 0.011*| 0.288| 0.717| 0.323| 0.297| 0.440 |
| Treatment         | -0.055| 0.085| 0.072| -0.030| 0.116| -0.066| 0.212| -0.078|
| Long              | 0.627| 0.451| 0.524| 0.794| 0.304| 0.562| 0.059*| 0.490 |
| Treatment         | 0.974| 0.444| 0.003*| 0.977| 0.622| 0.359| 0.558| 0.967 |
| History           | 0.240| 0.178| -0.015| 0.215| -0.156| -0.166| -0.134| -0.246|
| Comorbidities     | 0.322| 0.113*| 0.892| 0.055*| 0.167*| 0.141*| 0.238| 0.028*|
| Status            | -0.148| 0.038| -0.235| -0.207| -0.042| 0.084| -0.153| 0.120 |
| Social            | 0.191*| 0.737| 0.036*| 0.065*| 0.714| 0.457| 0.175*| 0.288 |
| Comorbidities     | -0.148| -0.044| 0.031| -0.255| 0.053| 0.164| -0.106| 0.163 |
| Long              | 0.191*| 0.698| 0.785| 0.023*| 0.639| 0.146*| 0.348| 0.149*|
| Disease           | 0.488| 0.085*| 0.167*| 0.322| 0.954| 0.557| 0.732| 0.943 |

Note: C (consequences); PD (Perception duration); PC (personal control); CT (control treatment); I (Identity); W (Worried); U (understanding); ER (emotional response)  
P * <0.25

3.3.2. Multivariate analysis on the questionnaire BIPQ

Significant value in the Table 6 shows that the perception of patients with T2DM domains will be influenced by several characteristics. In the perception of the consequences of showing the significant value of 0.012 in age characteristics. In the perception of personal control shows the significant value of 0.002 on job characteristics. In the perception of control treatment showed significant value of 0.000 at age characteristics. In the perception of identity indicates the significant value of 0.048 in life characteristics. In the perception of understanding demonstrated the significant value of 0.043 on the characteristics of the type of treatment. In consequence domain has a significant relationship to the characteristics of age, with p=0.012. This positive correlation of r=0.298 This means the correlation between the consequences with age is directly proportional, meaning that the increasing age of the patient will increase the consequences of the disease in which the increasing age makes one think more of a result that can arise by illness.
Table 6. Linear regression analysis of the characteristics to perception domain.

| BIPQ         | Variable       | Coefficients | ANOVA          |
|--------------|----------------|--------------|----------------|
|              |                | Beta         | Sign           | F   | Sign | $r$ |
|              |                |              | beta In        |      |      |    |
| Consequence  | Age            | 0.067        | 0.012          |      |      |    |
|              | Social status  | -            | -              |      |      |    |
|              |               |              | -0.049         | 0.669|      |    |
| Personal     | Job            | 1.173        | 0.002          |      |      |    |
| Control      | Income         | -            | -              |      |      |    |
|              | Social status  | -            | -              |      |      |    |
|              | long illness   | -            | -              |      |      |    |
|              | Job            | 0.056        | 0.000          |      |      |    |
| Identity     | Age            | -            | 0.048          |      |      |    |
|              | Social status  | -            | -              |      |      |    |
| Understanding| This type of   | 0.918        | 0.043          |      |      |    |
|              | treatment      |              |                |      |      |    |
|              | Social status  | -            | -              |      |      |    |

Domain of personal control has a significant relationship to the characteristics of the job, with p=0.002. This positive correlation of $r=0.331$ means the correlation between personal control at work is directly proportional, meaning that someone who works will improve the patient's personal control of the disease in which a person whose work will be more concerned about themselves against the disease. On the domain control treatment had a significant relationship to the characteristics of age with p=0.000. This positive correlation of $r=0.280$ means the correlation between the control treatment with age is directly proportional, meaning that increasing the age will improve the treatment of patients towards disease control where increasing age of the patient will make a person more concerned about the treatment of the disease. Domain identity has a significant relationship to the characteristics of age, with p=0.048. The negative correlation seen from the value of this mean $r=-0.197$ correlation between the control treatment was inversely related to age, which means increasing the age will lower the patient's identity to the increasing age of the disease where it will lower the patient down identify that diabetes mellitus type 2 disease.

In the domain of understanding have a significant relationship to the characteristics of this type of treatment, with p=0.043. This relationship discernible positive correlation of $r=0.212$ means understanding the correlation between the type of treatment is directly proportional, meaning that the increased understanding will improve the patient's type of treatment against the disease. According to the research domain can be interpreted as a consequence of an individual's belief about about the severity of the disease and its possible effect on the physical, social and psychological [26]. Good lifestyle and physical activity routine allows one to have a better health level [15].

Domain control describe the beliefs of individual treatment to treatment and expectations of treatment outcome [27]. Identity domain is defined as the idea of the patient's name, their conditions are basically (symptoms related) and the relationship between them [26]. Domain understanding interpreted as associated individuals understanding the disease [28]. Patient understanding of the disease will affect more effective treatment [29].

3.3.3. Multivariate analysis between the characteristics and the patient's quality of life (EQ-5D)

Based on the Table 7 can be seen that there are some characteristics that otherwise there is a significant relationship with the domains on the EQ-5D questionnaire. On EQ-5D questionnaire reveal any significant differences; dimensional index values with the characteristics of age, family history,
social status and comorbidities; dimensional visual analog scale with family history and social status. So that all variables have significant value and it selected for inclusion into the multivariate analysis.

**Table 7.** Spearman correlation test between characteristics of respondents and quality of life.

| Variable          | Domain EQ-5D | Value index | VAS |
|-------------------|--------------|-------------|-----|
| Age               | r            | 0.181       | 0.012 |
|                   | p            | 0.109 *     | 0.914 |
| Family history    | r            | 0.142       | -0.253 |
|                   | p            | 0.208 *     | 0.024 * |
| Social status     | r            | -0.451      | -0.326 |
|                   | p            | 0.000 *     | 0.003 * |
| Comorbidities     | r            | -0.028      | -0.072 |
|                   | p            | 0.012 *     | 0.528 |

* Spearman correlate p <0.25 (Dahlan, 2013)

3.3.4. Multivariate analysis on the EQ-5D questionnaire

**Table 8.** Linear regression analysis of the characteristics to quality of life domain.

| Domain      | Characteristics | Coefficients | excluded variable | ANOVA | r |
|-------------|-----------------|--------------|-------------------|-------|---|
| Value       | Age             | -            | -                 | 0.089 | 0.275 | 89.375 | 0.000 | - |
| index       | family history  | -            | -                 | 0.059 | 0.449 | 0.451 |
|             | Social status   | -0.781       | 0.000             | -     | -     |
|             | Comorbidities   | -            | -                 | -0.179 | 0.020 |
| VAS         | Family history  | -            | -                 | -0.201 | 0.044 | 22.132 | 0.000 | - |
|             | Social status   | -            | 0.000             | -     | -     | 0.326 |

22.954

Significant value in the table above shows the above table shows that the quality of life of patients with T2DM domains will be affected by a number of characteristics. On the dimension of the index value indicates the significant value of 0.000 on the characteristics of social status, it can be said characteristics variables significant predictors of social status index value. Negative correlation seen from the value $r=-0.451$, meaning the worse the social status the more it will degrade the quality of life of the index value. Looking at the results of the multivariate analysis can be concluded that the dominant social status can affect the dimensions of the index value in patients with T2DM on quality of life.

The results of the analysis, dimensional visual analog scale shows significant value of 0.000 on the characteristics of social status, it can be said to be a significant characteristic variable of social status become predictors of a visual analog scale. Negative correlation seen from the value $r = -0.326$, meaning the worse the social status the more it will degrade the quality of life of the visual analog scale. Rate from the multivariate analysis can be concluded that the dominant social status can affect the dimensions of a visual analog scale in patients with T2DM on quality of life. According to research the influence of marital status is related to family support is the most powerful indicator of a positive impact on self-care in patients with diabetes mellitus [30]. These negative attitudes can be
overcome with the support of the family. Family support is the most powerful indicator of the positive impact on self-care in patients with diabetes mellitus [30].

3.3.5. **Multivariate analysis between perceptions of quality of life**

Table 9. Spearman correlation test perceptions of the quality of life domain.

| Perception and characteristics | Quality of life value index | VAS |
|-------------------------------|-----------------------------|-----|
| Control treatment             | r 0.324                     | 0.073 |
|                               | p 0.003 *                   | 0.517 |
| Emotional response            | r -0.147                    | -0.101 |
|                               | p 0.193 *                   | 0.373 |
| Comprehension                 | r 0.132                     | 0.361 |
|                               | p 0.242 *                   | 0.001 * |
| Identity                      | r -0.242                    | -0.115 |
|                               | p 0.031 *                   | 0.310 |
| personal control              | r -0.043                    | 0.383 |
|                               | p 0.703                     | 0.000 * |
| Duration                      | r 0.093                     | -0.349 |
|                               | p 0.410                     | 0.002 * |
| Age                           | r 0.181                     | 0.012 |
|                               | p 0.109 *                   | 0.914 |
| Job                           | r -0.054                    | 0.146 |
|                               | p 0.632                     | 0.197 * |
| The type of treatment         | r -0.077                    | 0.120 |
|                               | p 0.495                     | 0.291 |

* Spearman correlate p <0.25 [31]

Based on the above table it can be seen that there are several domains of perception and characteristics that are otherwise meaningful relationships with quality of life. On the quality of life questionnaire reveal any significant differences; the index value in the control treatment, emotional response, understanding, identity, personal control, duration and age. on a visual analog scale on understanding, personal control, duration and job. So that all variables have significant value and it is selected for inclusion into the multivariate analysis.

3.3.6. **Multivariate analysis on the EQ-5D questionnaire**

Table 10. Linear regression analysis of perceptions to quality of life domain.

| EQ-5D | BIPQ | Coefficients | excluded variable | ANOVA | r |
|-------|------|--------------|-------------------|-------|---|
|       |      | Beta         | Sign              |       |   |
| Value index | Control treatment | 0.047 | 0.001 | - | - | 9.691 | 0.000 | **0.324** |
|         | Emotional response | -0.025 | 0.010 | - | - |       |       | **-0.147** |
|         | Comprehension | - | - | 0.148 | 0.166 |
|         | Identity | - | - | 0.003 | 0.979 |
|         | Age | - | - | 0.151 | 0.180 |
| VAS | Comprehension | 1.508 | 0.038 | - | - | 11.305 | 0.000 | **0.361** |
|        | duration | -0.992 | 0.002 | - | - |       |       | **-0.349** |
|        | personal control | 1.440 | 0.039 | - | - |       |       | **0.383** |
|        | Job | - | - | **-0.077** | 0.463 |
Significant value in the table above shows that the perception of patients with T2DM domains will be influenced by several domains of quality of life. In the domain of life quality index value indicates the significant value of 0.001 in the control domain of treatment. A discernible positive correlation of $r=0.324$, meaning that the better control of the disease the patient treatment will further improve the quality of life. In the domain of life quality index value indicates the significant value of 0.010 on the domain of emotional response. Negative correlation seen from the value $r=-0.147$, meaning the patient's negative emotional response to the disease the more it will decrease the quality of life. While the quality of life domain VAS shows the significant value of 0.038 on the domain understanding. A discernible positive correlation of $r=0.361$, meaning that increasing patient understanding of the disease will improve the quality of life. the quality of life domain VAS shows the significant value of 0.002 on the domain duration. Negative correlation seen from the value $r=-0.349$, meaning that the longer duration of the disease in patients will increasingly degrade the quality of life of patients. And the quality of life domain VAS shows the significant value of 0.039 on the domain of personal control. A discernible positive correlation of $r=0.383$, meaning that increasing the personal control of the disease the patient will improve patient quality of life. Looking at the results of the multivariate analysis can be concluded that the control of the dominant treatment and emotional responses can affect dimensional index values and understanding, the duration and the dominant personal control may affect the visual analog scale in patients with T2DM on quality of life.

According to research patient understanding of disease will affect more effective treatment [29]. Perception or understanding of health is influenced by how people believe in its ability to undergo treatment, life, psychosocial, educational owned and family support [32]. Effective treatment will impact the disease uncontrolled type T2DM, so the patient's quality of life can be improved. The existence of a significant relationship to the duration of the domain has been in line with research which mention duration has a significant relationship with quality of life. Patients with chronic diseases who require treatment in the long term will lead to a decrease in adherence when taking the drugs, so that control of the treatment to be bad. Poor control are treatment will reduce the quality of life of patients, due to ineffective treatment can aggravate the patient's disease. In line with previous studies conducted by [33] mentions that there was a significant relationship between perception and quality of life. Patients with chronic diseases are more likely to have unstable emotions (more irritable, anxious and fearful). The response of the negative emotions is what impact the poor quality of life [33].

4. Conclusion

There is a relationship between the perception and the quality of life. Based on the analysis results obtained to improve quality of life of patients with T2DM that is index value in the treatment and control emotional responses as well as on the visual analog scale on understanding, duration and personal control must be changed in order to increase the patient's quality of life. In this case the characteristic factor family history, social status and the type of treatment also affects the quality of life.

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