Perceived Benefits to Treatment Adherence, Perceived Barriers to Treatment Adherence, and Level of Treatment Adherence among Indonesian Older Adults with Type 2 Diabetes Mellitus

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Abstract — **The purpose of this descriptive correlation study is to describe the level of perceived benefits and the level of perceived barriers to treatment adherence and the level of treatment adherence, and to examine the relationship between these variables and level of treatment adherence among Indonesian older adults with type 2 diabetes mellitus. This study is important for health care providers and no one has reported a study done on this population. Purposive sampling technique was used to recruit study participants among members of PERSADIA (Indonesian Diabetes Association) in Bandar Lampung city, Indonesia. There were 164 participants that met the inclusion criteria, and the study had 100% response rate. Each consenting participant was asked to fill in the demographic and health information form and a scaled questionnaire on perceived benefits to treatment adherence, perceived barriers to treatment adherence for treatment adherence, and treatment adherence. Three experts on diabetes validated the instruments and Cronbach's alpha of the reliability test was high. The data analysis used descriptive statistics and Pearson's correlation test. The findings show that the level of perceived benefits to treatment adherence was high, perceived barriers to treatment adherence was low, and level of treatment adherence moderate. There is a significant positive correlation between perceived benefits to treatment adherence and level of treatment adherence and a significant negative correlation between perceived barriers to treatment adherence and perceived benefits to treatment adherence and level of treatment adherence. The positive perception of treatment adherence among Indonesian older adults with type 2 diabetes mellitus is attributable in part to the supportive roles of the health care providers and the family members of the study participants.**

Keywords-perceived benefits to treatment adherence; perceived barriers to treatment adherence; treatment adherence; type 2 diabetes mellitus; older adults.

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I. INTRODUCTION

Diabetes mellitus is a common and a challenging chronic endocrine disorder that occurs all around the world. In 2014, the prevalence of diabetes in Indonesia had been estimated to be nine million cases, and the number is growing [1]. Even today the prevalence of diabetes mellitus in Indonesia is ranked fourth in the world after India, China, and the United States of America [2].

Treatment adherence is important for type 2 diabetes patients in maintaining their standard level of blood glucose to prevent the complications of this disorder. According to Asante [3] among type 2 diabetes mellitus (T2DM) study participants aged ≥ 60 years, treatment adherence is essential for health behavior and improvement of well-being.

II. THEORETICAL BACKGROUND

Treatment adherence is defined as the degree to which a patient correctly follows medical advice and it has four dimensions such as (1) physical activity, (2) dietary behavior, (3) regular self-monitoring of blood glucose, and (4) medication adherence. These dimensions have close association with an improvement in blood glucose level and individual health behavior [3].

Health promotion model is an important framework for promoting health behavior. According to Pender's Health Promotion Model (PHPM), the factors that affect personal well-being are perceived benefits to treatment adherence and perceived barriers to treatment adherence for treatment adherence [4].

The study of perceived benefits and perceived barriers to treatment adherence in this research aims to understand the perceptions among Indonesian older adults with T2DM toward treatment adherence. According to the reports, patient's positive perception to treatment adherence will bring benefit to the patient's health. On the other hand, patients' negative perceptions to treatment adherence will become barriers to treatment adherence [4].

There is no report on the study done on the relationship between perceived benefits to treatment adherence, perceived barriers to treatment adherence, and level of treatment adherence among Indonesian older adults with T2DM. The researchers believe that this study will provide significant information for the health care providers for an improvement of the health services for patients with diabetes. Therefore, there is a need for this study to be carried out.

For these reasons, they would like to conduct research on the perceived benefits to treatment adherence, perceived barriers to treatment adherence, and level of treatment adherence among Indonesian older adults with T2DM. The objectives of this study are (1) To identify the level of perceived benefits to treatment adherence, perceived barriers to treatment adherence, and level of treatment adherence among Indonesian older adults with T2DM (2) to examine the relationship between perceived benefits and perceived barriers to treatment adherence and the level of treatment adherence variables among these patients.

III. METHODS

A. Sample

A purposive sampling technique was used to recruit participants of this study among members of the Indonesian Diabetes Association (PERSADIA) Bandar Lampung city, Indonesia. One hundred sixty-four study participants that met the inclusion criteria participated in this study. The inclusion criteria include an age of at least 60 years, using only oral medication, and have had T2DM for at least one year.

B. Data Collection Instruments

Demographic and Health Information. The researchers developed and used Demographic and Health Information Form (DHIF) on age, gender, religion, education level, marital status, occupation, income/month, accessibility health service, age of onset, duration, medications, number of family members, family history of diabetes mellitus, regular attendance in diabetes education programs, comorbidities, and blood glucose level.

Questionnaire. The questionnaire developed and used in this study consisted of three sections: perceived benefits to treatment adherence, perceived barriers to treatment adherence, and level of treatment adherence and each of these consisted of four components such as (1) physical activity, (2) dietary behavior, (3) regular self-monitoring of blood glucose, and (4) medication adherence. The questions in the perceived benefits to treatment adherence and the perceived barriers to treatment adherence sections were adopted and modified from Sechrist, Walker & Pender [5] and the level of treatment adherence sections from Brooks [6].

C. Validity and Reliability

Three experts validated the content of the instrument. The reliability of the questions for the perceived benefits to treatment adherence, perceived barriers to treatment adherence, and level of treatment adherence had Cronbach's alpha coefficient of 0.931, 0.839, and 0.819, respectively thus considered reliable for a newly developed instrument [7]. As a result of the reliability test, the authors eliminated two questions from the perceived benefits to treatment adherence section of the questionnaire; each of the rest of the sections has 20 questions all totaling 58 questions. The rating scale of the of the questionnaire was on Likert 4-scale (1) strongly disagree (2) disagree (3) agree (4) strongly agree for the perceived benefits to treatment adherence, and perceived barriers to treatment adherence sections and (1) never, (2) occasionally, (3), sometimes, (4), always for level of treatment adherence.

D. Ethical Consideration

The Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University, Thailand approved this study. The patients received all needed information before being asked to sign an informed consent and were given the right to refuse to continue to participate without any penalty. The researchers coded the identities of the patients anonymously, and destroyed the data collected from patients after the completion of the study.

E. Data Analysis

Descriptive statistic was used to analyze and describe the demographic characteristics, the level of perceived benefits to treatment adherence and perceived barriers to treatment adherence and the level of treatment adherence of the study participants. Pearson's correlation was used to analyze the relationship between perceived benefits to treatment adherence, perceived barriers to treatment adherence, and treatment adherence.

IV. RESULTS

A. Participants' Demographic Characteristics

As many as 118 (72 %) of the participants were aged 60-69 years old with a mean age of 64.13 ± 4.42 years, and 132 (80.5 %) of the participants were female. There were 148 participants (90.2 %) that were Muslims, 37 (22.6 %) of the participants had an education level of junior high school, 56 (34.1 %) senior high school and 33 (20.1 %) university. There were 155 (93.9 %) participants that were married, 78 (47.5 %) of them of were retirees. Regarding income, 42 (25.6 %) of the participants had an income of 80 – 160 USD.

B. Participants' Medical Characteristics

As many as 86 (52.4 %) of the participants reported that the health care center was the most accessible health service facility. Regarding duration of diabetes mellitus, the highest falls into the range of 1-10 years to which 59 (68.3 %) participants belonged to. The age of onset in 157 (96 %) of the study participants was above 43 years old and 135 (82.3 %) of the participants consumed Biguanides class of medicine. There were 103 (65.2 %) participants that consumed combined types of diabetes mellitus medicine. Among 145 (88.4 %) participants, their number of family members ranged from 1 to 5 persons. In terms of family history for diabetes mellitus, 43 (25.6 %) of the participants reported having a mother who had diabetes. There were 57 (34.8 %) of the participants had their food prepared by their daughter at home and 150 (91.5 %) of

the participants attended diabetes education program regularly. The overall mean of the fasting blood glucose of the study participants is 144 (± 55.7 SD) mg/dl and 190 (± 79.8 SD) mg/dl as the random blood glucose level.

C. Levels and Relationships of Perceived Benefits to Treatment adherence, Perceived Barriers to Treatment Adherence, and Level of Treatment Adherence

Table 1 summarizes the level of perceived benefits to treatment adherence perceived barriers to treatment adherence, and level of treatment adherence scores. Overall, the level of perceived benefits to treatment adherence is high. From the four domains of perceived benefits to treatment adherence, the highest section belongs to physical activity and the lowest section belongs to self-monitoring. Overall, the level of perceived barriers to treatment adherence are at a low level, the highest section belongs to regular self-monitoring, and the lowest section belongs to medication adherence. Overall, the level of level of treatment adherence is at a moderate level. Among the four domains of treatment adherence, the highest sections belong to medication adherence and the lowest belongs to self-monitoring.

TABLE 1. LEVEL OF MEAN AND STANDARD DEVIATION OF VARIABLES

Variables	Mean	SD	Level
Perceived benefits to treatment adherence (overall)	3.23	0.66	High
Medication adherence	3.31	0.08	High
Dietary behavior	3.30	0.10	High
Physical activity	3.33	0.05	High
Self-monitoring blood glucose	3.01	0.47	High
Perceived barriers to treatment adherence (overall)	1.81	0.73	Low
Medication adherence	1.65	0.16	Low
Dietary behavior	1.86	0.18	Low
Physical activity	1.80	0.09	Low
Self-monitoring blood glucose	1.92	0.39	Low
Level of treatment adherence (overall)	2.83	0.80	Moderate
Medication adherence	3.05	0.27	High
Dietary behavior	2.87	0.52	Moderate
Physical activity	2.87	0.23	Moderate
Self-monitoring blood glucose	2.47	0.55	Moderate

D. Relationship Between Perceived benefits to treatment adherence, Perceived barriers to treatment adherence, and Treatment Adherence

Table 2 presents the relationship between perceived benefits to treatment adherence and level of treatment adherence of the subjects is in. The results of the correlation showed that there is a significant positive correlation between perceived benefits to treatment adherence and treatment adherence. Table 2 also presents the relationship between perceived barriers to treatment adherence and treatment of the subjects. The results of the correlation showed that there is a significantly negative correlation between perceived barriers to treatment adherence and treatment adherence.

TABEL 2. RELATIONSHIP BETWEEN PERCEIVED BENEFITS TO TREATMENT ADHERENCE, PERCEIVED BARRIERS TO TREATMENT ADHERENCE, AND LEVEL OF TREATMENT ADHERENCE (N = 164).

Factors	Perceived Benefits	Perceived Barriers	Level of Treatment Adherence
1. Perceived benefits	1	-0.529*	0.690*
2. Perceived barriers	-0.529*	1	-0.453*
3. Treatment adherence	0.690*	-0.453*	1

*P <0.001

V. DISSCUSION

The majority of the study participants highly perceived that physical activity prevents complications of diabetes and that they would live longer if they would exercise routinely. They exercised regularly even though it was rather inconvenient for them to exercise e.g. the place for exercise was far from their house, their shoes were wet, and the weather is not desirable. A similar level of perceived benefits to treatment adherence of regular exercise for patients with T2DM was also shown by the participants of the study done by Zunft et al. [8].

In this study, the health care providers always reminded the participants to exercise during the diabetes education programs. Every Tuesdays and Thursdays the health care center conducted group exercise consisting of the health care providers and its members. It has been reported that health care providers had an important role in good behavior outcomes and achieving good glycemic control of type 2 diabetes mellitus through exercise [9]

The study participants also highly perceived that following a good diet regularly could prevent diabetes complications and could keep blood glucose levels down. They managed their choice of foods well even when around people eating the kinds of food that are not right for them as patients with diabetes. The majority of the study participants regularly attended the diabetes education in the health center regularly where they received nutrition education. The family accompanied most of those attending the health education program. They adhered to the diet of diabetes because of family support who always reminded them to always control their diet.

Beside the important role of health care providers in motivating the patients to exercise, the role of family and nutrition education are also important. Patients with supportive families were more likely to have a healthier behavior [10]. Nutrition education effectively improves knowledge and behaviors of patients with diabetes [11].

Chlebowy, Hood, and Lajoie [12] reported that blood glucose self-monitoring is a reflection of self-awareness to the

disease. Most of the study participants reported that they had some concern about their blood glucose levels because they were aware that uncontrolled blood glucose that are not could lead to complications. The health educators constantly reminded them during the education programs that monitoring blood glucose is very crucial in preventing diabetes complications. Some study participants did not check their blood glucose daily because they did not have glucometer of their own due to its high price. This group of study participants voluntarily took the initiative to have their blood glucose checked when they come to attend the monthly diabetes education program at the health center. Diabetes education programs are important in motivating patients to control blood glucose. Because, the education programs provide the patients with knowledge on how to control their blood glucose and subsequently prevent complications [13].

The majority of the study participants highly perceived that medication is important in controlling blood glucose level to prevent any complications. They believed that it was important to consume their medication regularly and that is why they always took their medication along everywhere they went, and they always picked up their new medication at the health center or hospital whenever their medication ran out. The participants also consumed the medication even though they felt well. Health education programs also played an important role in motivating better behavior in adhering to the treatment of diabetes mellitus and to control their blood glucose [13].

In Indonesian culture the family support is an important social norm, that is why most of the older adults in Indonesia lived with their married children because they have a high concern and care for their parents including buying medicines when the medication runs out [14]. Results of a study done by Nagelkerk, Reick, and Meengs [15] show that positive family relationships played an key role in the behaviors of patients with T2DM.

In this study, the families of the participants showed support by reminding them always to consume medication, by cooking healthy foods following the instructions of the health care providers, by exercising together and by accompanying them to the health care center or hospital to check the blood glucose level. According to Albright, Parachman & Burge [16], family relationships can be an important source of support for patients with diabetes. Similarly, according to Barcia-Huidbro, Bittner, Barhm & Puschle [10], patients with supportive families are likely to have healthier behavior outcomes.

There is a significant positive correlation between perceived benefits to treatment adherence and level of treatment adherence. Therefore, their perceptions of experiencing a positive consequence of adopting a health behavior can consequently improve their level of adherence to treatment [17]. When perceived benefit of an action is high and the willingness to do the action is also high, then the expected behavior will be manifested by the patients [4, 18]. Perceived benefits to treatment adherence among patients with T2DM was found to have a significant positive relationship with treatment adherence [19].

The study by Pender, Carolyn & Mary [4] found a significant negative relationship between perceived barriers to treatment adherence and level of treatment adherence. The low level of perceived barriers to treatment adherence among the participants this study and their high willingness to adopt a good health behavior resulted in their good adherence to treatment. This observation is supported by the previous research done by Pourghazneina, Ghaffarib, and Chamanzari [19] which reported that there was a significant negative relationship between perceived barriers to treatment adherence and level of treatment adherence among patients with T2DM.

VI. CONCLUSION

This study found that overall, the level of perceived benefits of treatment adherence was high, perceived barriers to treatment adherence low, and level of treatment adherence moderate. Also, there was a significant positive correlation between perceived benefits to treatment adherence and level of treatment adherence and a significant negative relationship between perceived barriers to treatment adherence and level of treatment adherence. The significantly positive perception on the level of treatment adherence among Indonesian older adults with type 2 diabetes mellitus is partly attributable to the supportive roles of the health care providers and the family members of the study participants.

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