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# Diabetes Self Management among Adults with Type 2 Diabetes Mellitus in Malang, Indonesia

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**Abstract:** Patients with diabetes mellitus practice self management that can allow them to assume responsibility and control of their own diabetes management. The aim of this study is to identify diabetes self-management among adults with type 2 diabletes mellitus. A cross sectional design was used. A total of 127 adults with type 2 diabetes mellitus, aged from 20-59 years were participated. Participants were selected by multi-stage random sampling in public health centers of malang city. The Summary of Diabetes Self-Care Activities (SDSCA) was used to measure diabetes self management. Descriptive statistics were used to characterize the sample. The results showed that more than half of the participants took properly care of their feet by regularly washing (66.9%), soaking (63.8%) and drying them (51.2%). Approximately 44% of the participants had a good performance in taking medication. However, 38.5 % of the participants did not follow a healthy eating plan and 44% of the participants did not participate in a physical activity routine of at least 30 min. In conclution, diabetes self management included healthy eating activities, physical activity, medication adherence, blood glucose testing and foot care as important for diabetic to prevent complication.

**Key words:** Self management, diabetes mellitus, adults, Indonesia, diabetes

## INTRODUCTION

Type 2 diabetes used to be called non-insulin dependent diabetes or adult-onset diabetes and accounts for at least 90% of all cases of diabetes worldwide. It is characterized by impaired insulin action through insulin resistance (IDF, 2014). The pathogenesis of type 2 diabetes mellitus is characterized by insulin resistance and impaired insulin secretion.

Malang city is the second biggest city in East Java province. Malang city is a district located in East Java Province covering area of 110.06 km$^2$. Malang city consists of 5 sub-district: Kedungkandang, Klojen, Sukun, Lowokwaru and Blimbing (GM, 2015). There were 19,167 cases of morbidity in Malang City related to type 2 diabetes mellitus in the year 2013 (DHM, 2013).

Type 2 diabetes is related to being overweight or obese which can cause insulin resistance and lead to high glucose levels in the blood. People with type 2 diabetes can often self-manage their condition through exercise and diet. However, over time most people will require oral drugs and/or insulin (IDF, 2014). Individuals are expected to make major lifestyle changes to their diet and exercise patterns which are the foundation of treatment and the most difficult components of self-management (Nagelkerk *et al*., 2006). Patients with diabetes mellitus should be educated to practice self-care that can allow them to assume responsibility and control of their own diabetes management. Diabetes self management includes blood glucose monitoring, body weight monitoring, foot care, personal hygiene, a healthy lifestyle (diet and physical activity), identifying targets for control, stopping smoking and limiting alcohol intake (MHM, 2009). The management of diabetes is self directed, in that individuals are responsible for the day to day decisions related to controlling their disease (AADE, 2010).

Diabetes self management behaviors are the most important measures for achieving optimal glycemic control which is associated with a decrease in the development of diabetes complications. Therefore, the aim of this research is to identify diabetes self management among Adults with Type 2 Diabletes Mellitus in Malang, Indonesia.

## MATERIALS AND METHODS

In this research, a quantitative approach with descriptive study was used. The sample was collected from 127 adults with type 2 diabetes mellitus from five

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Public Health Centers (PHCs) in Malang City, Indonesia using multi-stage sampling technique. The participant should include in inclusion criteria: age 20-59 years old, have diagnosed type 2 diabetes (for at least 6 months based on PHC's medical records) have blood glucose level between 70 and 300 mg $dL^{-1}$ are willing to participate in this study and are able to read and write Bahasa Indonesia.

Research instruments used are questionaires, consisting of questionaires on) personal factors) diabetes self-management. Personal factors included gender, age, treatment and educational. This questionnaire was developed by the researcher. Diabetes self management was measured by the Summary of Diabetes Self-Care Activities (SDSCA). The SDSCA is a brief self-report questionnaire about diabetes self management behaviors including diet, exercise, blood glucose testing, medication and foot care. In a seven study review of the original SDSCA for reliability, validity and normative data, the SDSCA questions were revised.

In this study used the revised SDSCA including 15 items and assesses aspects of healthy eating activities (5 items), physical activity (2 items), medication adherence (1 items), blood glucose testing (2 items) and foot care (5 items). The SDSCA used a likert-type scale in which participants recall how often they performed diabetes self management during the past 7 days and answers range from 0-7 day. The reliability with Cronbach's alpha was 0.720.

Data collection were started after gaining an approval from the Ethical Review Board (ERB) committee of Boromarajonani College of Nursing Nopparat Vajira (BCNNV-Bangkok Thailand) and permission letter from the Health Department (HD) Malang City. The questionnaires were completed by self-administered questionnaire and required approximately 60 min.

Data analysis used Statistical Package for the Social Sciences (SPSS Version 16.0) for windows. Descriptive statistics were used to characterize the sample. The personal factors (gender, age, treatment and educational) were explained using frequencies, percentage and median since the data was not normal distributed. Diabetes self management was established using Mean (M), Standard Deviation (SD), minimum, maximum, frequencies, percentage (GM, 2015).

## RESULTS AND DISCUSSION

**Results:** Personal factors of participants including gender, age, treatment and educational. A total of 127 participants were included in the analysis. Most of the participants (70.1%) were female. The majority of the participants used the combination of diet and medication treatment (78%). The median age of the participants was 55 years old. The majority of age of the participants (75.6%) ranged from 51-59 years old. The participants earned elementary and senior high school, 37 and 27.6%, respectively.

Table 1: Number and percentage of levels of diabetes self management (n = 127)

| Diabetes self management | Number | Percent |
|---|---|---|
| Good | 6 | 4.7 |
| Moderate | 40 | 31.5 |
| Poor | 81 | 63.8 |
| Mean±SD = 3.81±1.08 | | |
| Min-max = 1-7 | | |

Table 2: The distribution of diabetes self management by domains

| Domain | $\bar{x}$ | SD |
|---|---|---|
| Diet | 4.33 | 1.49 |
| Exercise | 4.19 | 1.43 |
| Blood sugar testing | 2.07 | 2.05 |
| Medication | 3.95 | 2.93 |
| Foot care | 4.09 | 1.82 |

**Level of diabetes self management:** Table 1 shows that the diabetes self management mean scores ranged from 1-7 with the mean score of all participants of 3.81 and standard deviation of 1.08. Table 1 shows that more than half of the participant's diabetes self-management (63.8%) was classified as "poor".

**The distribution of diabetes self management by domains:** The mean score of diabetes self management in diet domain was 4.33 (SD = 1.49). The mean score regarding exercise domain was 4.19 (SD = 1.43) and the mean score in blood sugar testing domain was 2.07 (SD = 2.05) as shown in Table 2.

**The distribution of diabetes self management (n = 127):** Table 3 shows diabetes self-management among adults with type 2 diabetes mellitus in Malang city, East Java Indonesia. Some participants maintained satisfactory diabetes self-management but many participants need to improve their diabetes self-management. More than half of the participants took properly care of their feet by regularly washing (66.9%), soaking (63.8%) and drying them (51.2%). Approximately 44% of the participants had a good performance in taking medication. However, some practices related to diet and exercise should be improved. For example, 38.5% of the participants did not follow a healthy eating plan and 44% of the participants did not participate in a physical activity routine of at least 30 min.

The findings showed that the majority of the participants in this study were female (70.1%). It was related to the incidence of diabetes worldwide that indicated that women tended to have diabetes than men

Table 3: The distribution of diabetes self management (n = 127)

| | Percentage | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Diabetes self management items | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Diet** | | | | | | | | |
| The last 7 days you have followed a healthful eating plan | 12.6 | 3.9 | 9.4 | 12.6 | 15.0 | 7.1 | 9.4 | 29.9 |
| On average, over the past month, days per week you have followed your eating plan | 10.2 | 3.9 | 6.3 | 16.5 | 13.4 | 11.0 | 10.2 | 28.3 |
| The last 7 days you eat five or more servings of fruits and vegetables | 3.1 | 8.7 | 10.2 | 11.8 | 18.1 | 9.4 | 11.8 | 26.8 |
| The last 7 days you eat high fat foods such as red meat or full-fat dairy products | 27.6 | 8.7 | 11.8 | 20.5 | 10.2 | 6.3 | 3.1 | 11.8 |
| The last 7 days you space carbohydrates evenly through the day | 18.9 | 4.7 | 10.2 | 20.5 | 9.4 | 5.5 | 3.9 | 26.8 |
| **Exercise** | | | | | | | | |
| The last 7 days you participate in at least 30 min of physical activity? | 9.4 | 9.4 | 14.2 | 11.0 | 4.7 | 7.9 | 3.9 | 39.4 |
| The last 7 days did you participate in a specific exercise session | 14.2 | 15.0 | 15.7 | 12.6 | 9.4 | 4.7 | 3.1 | 25.2 |
| **Blood sugar testing** | | | | | | | | |
| The last 7 days you test your blood sugar | 18.1 | 48.8 | 5.5 | 7.1 | 3.1 | 3.9 | 3.1 | 10.2 |
| The last 7 days you test your blood sugar the number of times Recommended by your health care provider? | 18.9 | 47.2 | 4.7 | 6.3 | 4.7 | 3.1 | 4.7 | 10.2 |
| **Medication (n = 107)** | | | | | | | | |
| The last 7 days, you take your recommended diabetes medication | 3.7 | 21.5 | 0.9 | 10.3 | 3.7 | 2.8 | 13.1 | 43.9 |
| **Foot care** | | | | | | | | |
| The last 7 days, you check your feet? | 40.9 | 7.90 | 11.0 | 7.9 | 3.1 | 3.1 | 5.5 | 20.5 |
| The last 7 days, you inspect the inside of your shoes | 48.8 | 10.20 | 7.9 | 4.7 | 6.3 | 1.6 | 3.9 | 16.5 |
| The last 7 days, you wash your feet | 2.4 | 6.30 | 7.1 | 4.7 | 3.1 | 4.7 | 4.7 | 66.9 |
| The last 7 days, you soak your feet | 3.1 | 6.30 | 8.7 | 5.5 | 1.6 | 3.9 | 7.1 | 63.8 |
| The last 7 days, you dry between your toes after washing? | 18.9 | 7.10 | 5.5 | 6.3 | 1.6 | 4.7 | 4.7 | 51.2 |

and diabetes is the 9th leading cause of death in women which may link to living longer and less physical activity than men, both reasons can be risk factors for diabetes (EIWH, 2012). Moreover, the majority of participant's age (96.1%) in this study was middle adults (40-59 years old). For both men and women, the proportion of people with diabetes raised with age (EIWH, 2012).

The majority of the participants used the combination of diet and medication (78%). Medications of type 2 diabetes mellitus including insluin therapy and other medications had dramatically enhanced both the length and quality of life for people with type 2 diabetes mellitus (Pfizer, 2014). Then, the findings showed that all participants had finished a formal education of at least elementary school level. Approximately one third of the participants earned elementary school and followed by senior high school (27.6%).

In this study, it was found that more than half of the participants (63.8%) had poor level of diabetes self management. It might be caused by a few of the participant's knowledge, perception and support in diabetes self management in this study were in the high level. Lack of knowledge or misunderstanding may be the primary reason for unhealthy behavior (Huang *et al*., 2014). Moreover, the mean score of diabetes self management of the participants was 3.81 which ranged score 1-7. This finding indicated that the performances of the participant's diabetes self management were less than optimal level. This finding confirmed the results of previous study in Malang, where type 2 diabetes sufferers in both urban and rural areas also showed a less than optimal level of diabetes self-management behaviors (Rahayu, 2014).

In general, the diabetes self management in this study included healthy eating activities, physical activity, medication adherence, blood glucose testing and foot care. Healthy eating activities of participants in this study included following a healthy eating plan, eating fruits and vegetables and avoiding high fat food and spaced carbohydrates consumption. The results showed that following a healthy eating plan was the most frequently performed in diabetes self-management ($\bar{x}$ = 4.33). However, approximately half of participants followed a healthful eating plan (53.5 %) and ate fruits and vegetables only on four days or less per week (51.9%). Unfortunately, most of the participants (68.6%) ate high fat foods on 4 days or more per week. These phenomena may link to the culture of people in Indonesia (53.1%) that commonly consume sweet food mentioned in (MDRD, 2013). These findings clearly illustrated that the healthy eating activities of the participants still needed to be improved.

Physical activities in this study referred to engaging in at least 30 min of physical activity (as the total time frame of a continuous activity, including walking) and participating specific exercise session. The findings showed that 48.7% of the participant took parts in at least 30 min of physical activity and most of them participated specific exercise session (66.9%) in 4 days or less than four time per week. It might be caused by the insufficient time for exercise. Lack encouragement, support or

companionship from family and friends could be the main reasons preventing the participants from engaging more in more elaborate physical exercises (CDCP, 2011).

Furthermore, around 44% of the participants took medication everyday. This might indicate that individuals with type 2 diabetes mellitus were more likely to perform self management behaviors that required least effort and lifestyle changes. It was in contrast with a previous study that found that good performed self care management behavior was medication taking (Albikawi and Abuadas, 2015).

The least performed of diabetes self management was the blood glucose testing ($\bar{X}$ = 2.07). One of the possible explanations was that having the equipment and materials for the testing was costly. The possible reasons for low adherence to the blood glucose testing could be related to that the motivation for Self Care Management of Blood Glucose (SMBG), since many patients with type 2 diabetes mellitus found that regular testing is difficult to be adhered, it required motivation on the part of the patient (Heisler, 2004).

In this study, more than half of the participants reported that washing and soaking their feet every day in the last seven days is highest. Similarly, Bell found that the most frequently performed self care management behavior was foot care. Furthermore, this phenomenon may be congruent with the Muslim practice which is common activities before praying (Albikawi, and Abuadas, 2015). On the other hand, this study also found that approximately 41% of the participants had never checked or dried their feet and between the toes after washing as well as inside shoe inspection before wearing. These behaviors are not appropriate for diabetes care because it may lead to the serious infected wound from neuropathy of lower extremities. These findings also demonstrated that promoting feet check by giving instruction or raising awareness should be performed for people with diabetes mellitus in Malang city.

## CONCLUSION

Diabetes self management included healthy eating activities, physical activity, medication adherence, blood glucose testing and foot care. The participants have good performance in medication adherence, blood glucose testing and foot care. However, healthy eating activities, physical activity still need improvement.

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## REFERENCES

AADE., 2010. AADE guidelines for the practice of Diabetes Self Management Education and Training (DSME/T). American Association of Diabetes Educators, Chicago, Illinois.

Albikawi, Z.F. and M. Abuadas, 2015. Diabetes self care management behaviors among jordanian type two diabetes patients. Am. Intl. J. Contemp. Res., 5: 87-95.

CDCP., 2011. Overcoming barriers to physical activity. Centers for Disease Control and Preventions, Atlanta, Georgia, USA.https://www.cdc.gov/physicalactivity/basics/adding-pa/barriers.html.

DHM., 2013. Health data reports year 2013. Department of Health of Malang, Malang, Indonesia.

EIWH., 2012. Women and diabetes in the EU. European Institute of Women's Health, Republic of Ireland. http://www.epaac.eu/from_heidi_wiki/Women_and_Diabetes_13_Nov_FINAL_1.pdf.

GM., 2015. Geographic. Government Of Malang, Malang, Indonesia. http://malangkota.go.id/sekilas-malang/geografis/.

Heisler, M., 2004. Glycemic self-monitoring and insurance coverage. Can. Med. Assoc. J., 171: 48-49.

Huang, M., R. Zhao, S. Li and X. Jiang, 2014. Self-management behavior in patients with type 2 diabetes: A cross-sectional survey in Western Urban China. PloS One, Vol. 9,

IDF., 2014. About diabetes. International Diabetes Federation, Brussels, Belgium.

MDRD., 2013. Presentation principles of basic health research results 2013. Ministry's Division of Research and Development, Singapore, Asia. http://www.depkes.go.id/resources/download/general/pokok2%20hasil%20riskesdas%202013.pdf.

MHM., 2009. Clinical Practice Guidelines (CPG) on management of Type 2 Diabetes Mellitus (T2DM). Ministry of Health Malaysia, Malaysia.

Nagelkerk, J., K. Reick and L. Meengs, 2006. Perceived barriers and effective strategies to diabetes self-management. J. Adv. Nurs., 54: 151-158.

Pfizer, 2014. The value of medicines for type 2 diabetes. Pfizer Inc., New York, USA.

Rahayu, H.T., 2014. Living with chronic illness: Factors associated with self-management behavior among community diabetes patients in Indonesia. Master Thesis, National Cheng Kung University, Tainan, Taiwan.