

Study of Diabetic Mellitus and Knowledge of Lotion Foot Care on the Community

Athiyah U², Hendradi E¹, Rosita N¹, Erawati T¹, Purwanti T¹, Hariyadi DM^{1*}

¹Department of Pharmaceutics, Faculty of Pharmacy, Universitas Airlangga, Surabaya
²Department of Community Pharmacy, Faculty of Pharmacy, Universitas Airlangga, Surabaya

Received: 11th Apr, 18; Revised: 4th Jul, 18, Accepted: 1st Sep, 18; Available Online: 25th Sep, 2018

ABSTRACT

The prevention of Diabetic Mellitus (DM) and its complications is the main aim of this study, in addition to the training of lotion foot care application and the development of small scale industry. The research team delivered knowledge in the form of training on Diabetic Mellitus, healthy food, treatment and prevention of complications, and small-scale production of cosmetic products. The aim of this study was to determine the correlation between training on diabetic and lotion foot care application as preventive measures against diabetic complications on the patient's blood glucose levels in the community of residents in Banyuurip Jaya, Surabaya. It was expected from this training that the knowledge of the residents increases and people living with diabetic undergo lifestyle changes and therefore blood sugar levels can be controlled. The parameters measured in this research were blood glucose levels, the anti diabetic drug types consumed, and compliance on diabetics. This study used the data taken from 60 patients with DM over a period of one month. Questionnaires and log books was used to retrieve data and changes in blood glucose levels in diabetic patients. The results showed the demographic data of patients with type 2 diabetic of 85% female and 15% male, with the range of patients aged of 61-70 years of 46.67% and had history of diabetic (90%). The history of drugs consumed by respondents was anti diabetic drugs such as metformin (40%), glimepiride (33.37%) and insulin (6.67%). In addition, the increased knowledge of DM patients after being given the training compared to before training was shown in several questions in the questionnaire. A statistical analysis using t-test analyzed a correlation between training provided in order to enhance understanding of the patient, as well as correlation with blood glucose levels. A paired T-test showed that there was a relationship between the knowledge of trainees before and after training ($p < 0.05$). An interesting result was that there was no relationship between blood glucose levels before and after training provided ($p > 0.05$).

Keywords: Diabetic Mellitus, Antidiabetic Drugs, Lotion Foot Care, Blood Glucose Level.

INTRODUCTION

Diabetic in Indonesia is one of the leading causes of death. Indonesia ranks for the 4th for the number of diabetic mellitus patients in the world (WHO data). The number of patients has continued to increase since 2000, and in 2030 it is predicted the prevalence of Diabetic Mellitus (DM) in Indonesia will reach 21.3 million people¹. Based on the results of Basic Health Research (Riskesmas) in 2007, it was found that the proportion of causes of death due to DM in the age group of 45-54 years in urban areas was ranked second at 14.7%, while in rural areas it ranks 6th at 5.8%. The survey results of the Central Bureau of Statistics (BPS) in 2010 showed that the prevalence of Diabetic Mellitus in urban areas reached 14.7%, while it comprised 7.2% of health cases occurring in rural areas².

In the elderly population of Indonesia, it has been known that the number of various health problems and diseases that are typical in the elderly will increase, including Diabetic Mellitus. The data from the International Diabetic Federation (IDF) found that the prevalence of Diabetic Mellitus in the United States was 9.3%, while in

Malaysia and Indonesia in 2011 the prevalence was high at 5.9 and 12.1% respectively³. It is predicted that in 2020 the number of the elderly in Indonesia is estimated to reach 28.8 million people or about 11.34%. Indonesia has an elderly population of more than 7% above the provisions of the world organization, classifying it as an elderly people-structured country².

Causes of high number of DM patients include changes in people's lifestyles due to lack of knowledge and low education, the lack of awareness to maintain health, unregulated diet, and the lack of physical activity. This is because the prevalence of DM in the elderly has multiple factors, both intrinsic and extrinsic.

Age is one of the factors that influence the change of bodily tolerance to glucose. The incidence of type II Diabetic Mellitus in the elderly continues to increase due to lifestyle changes, especially in eating unhealthy foods, lack of physical exercise, and psychosocial factors. Type II Diabetic Mellitus (Non-Insulin-dependent Diabetic Mellitus) patients have two types of vascular complications, namely macrovascular complications and microvascular complications. Macrovascular

Table 1: Demography of Type 2 DM patients.

Demography	Number (n)	%
Sex		
a. Male	9	15
b. Female	51	85
Age		
a. 20-30	3	5
b. 31-40	2	3.33
c. 41-50	2	3.33
d. 51-60	10	16.67
e. 61-70	28	46.67
f. 71-80	13	21.67
g. 81-90	1	1.67
h. 91-100	1	1.67
The top diseases of the trainees		
a. Diabetic	45	90
Hypertension	3	6
c. Cholesterol	2	4

Table 2: Disease History of Training Participants.

Disease History	n	Percentage (%)
diabetic	45	75
hypertension	3	5
TBC	1	1.67
gastric acid	1	1.67
high cholesterol	2	3.37
heart disease	1	1.67
liming	1	1.67
nervous diseases	1	1.67
gout	1	1.67
blood presssure	1	1.67
vertigo	1	1.67
osteoporosis	1	1.67
cyst	1	1.67

Table 3: History of Drug Usage of Training Participants.

Drug type	n	Percentage (%)
Metformin	24	40
glimepiride	20	33.37
Insulin	4	6.67
captopril	4	6.67
simvastatin	2	3.37
aftor	1	1.67
acarbos	1	1.67
artoplan	1	1.67
glibenclamide	1	1.67
niphedipine	1	1.67
TBC drugs	1	1.67

complications include coronary heart disease, cerebrovascular disease, stroke, and peripheral vascular disease. While microvascular complications were included retinopathy, nephropathy, and neuropathy diabetic⁴.

Elderly people who are less knowledgeable about the Diabetic Mellitus disease and behaviors to prevent complications are basically influenced by low education, a lack of information, and the age factor. The elderly has a lot of decline in cognitive functions, rendering them less

Table 4: Complete data of drugs consumed by trainees for 1 month.

Drug type	Total Number	Percentage (%)
1. Antidiabetic Drugs		
Glimepiride tab (1mg)	6	24
Acarbose tab (50mg)	3	12
Metformin	6	24
Metformin (500mg)	1	4
Lantus Insulin (24cc)	1	4
Novoravit Insulin (12cc)	1	4
Gliben	3	12
Deculin	1	4
Pioglitazone	1	4
Insulin 10	1	4
Glucodex	1	4
2. Anti-Hypertension Drugs		
Amlodipine	1	11.1
captopril	2	22.2
Captopril (25mg)	1	11.1
Artoplan	1	11.1
Niphedipine	1	11.1
Adalat Oros (30mg)	1	11.1
Amlodipine	1	11.1
Valesco	1	11.1
3. Analgesic drugs		
Paramex	2	15.38
Oskadon	3	23.07
Mefenamic acid	2	15.38
Bodrex	2	15.38
Neuralgin	1	7.69
Mefinal	1	7.69
Antalgin	1	7.69
Aspilet	1	7.69
4. Gastritis drugs		
Lansoprazole	1	25
Mylanta	1	25
Promag	2	50
5. Gout Drugs		
Montali	1	33
Allopurinol (100mg)	2	67
6. Antihistamine Drugs		
CTM	1	50
Insidal	1	50
7. Vitamins and Supplements		
Neurodex	2	25
Vitamin	1	12.5
Nutrilite	1	12.5
Viostin ds	1	12.5
Corovit	1	12.5
Vitamin C	1	12.5
Carrol	1	12.5

able to receive information. If this condition is ignored, the risk of Diabetic Mellitus prevalence will increase, resulting in more dire situations by the emergence of Diabetic Mellitus complications. Factors that can influence preventive behaviors against complications

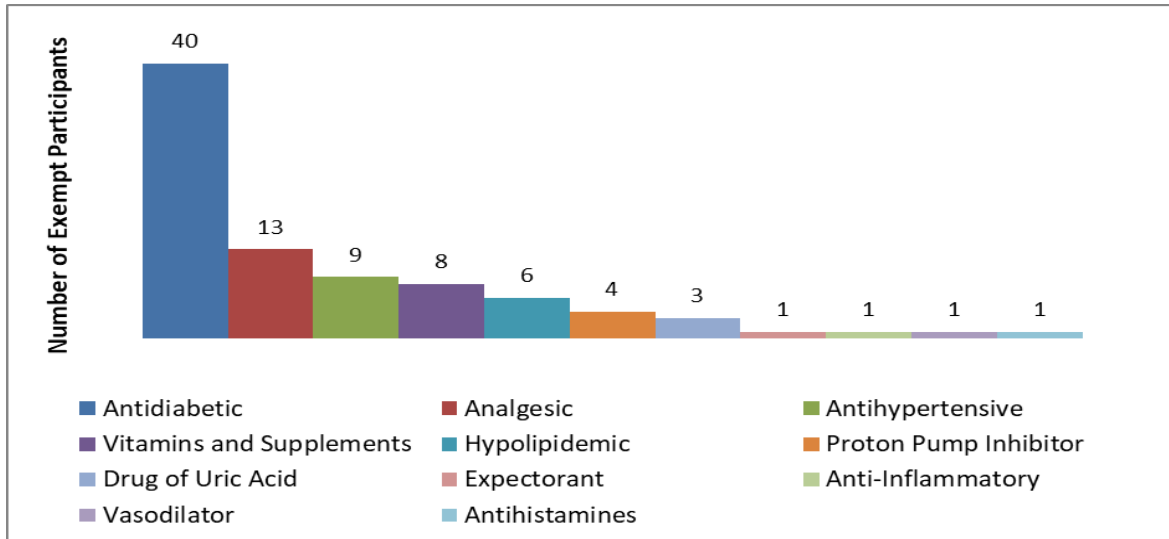


Figure 1: Types of drugs consumed by trainees during 1 month.

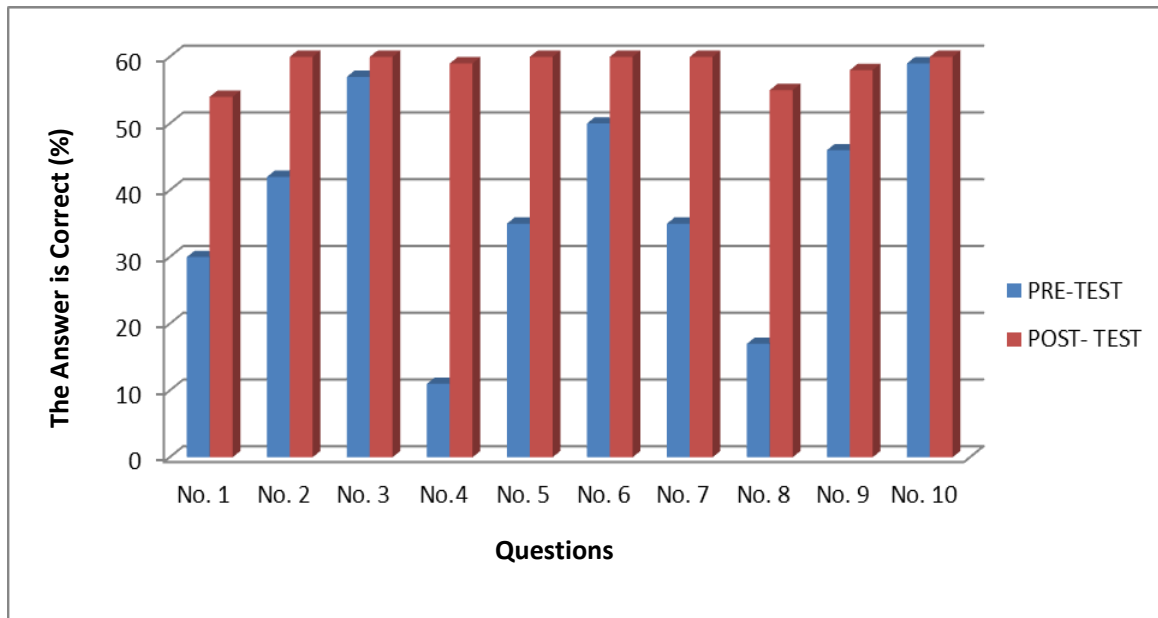


Figure 2: Recapitulation of Pre-Test and Post-Test Results of Training Participants.

Table 5: Blood Sugar Levels Before and After Training.

Blood sugar level (mg / dL)	Before	Percentage (%)	After	Percentage (%)
50-100	9	15	11	18.33
101-200	15	25	22	36.67
201-300	20	33.37	22	36.67
301-350	12	20	4	6.67
> 350	4	6.67	1	1.67

include a healthy lifestyle, activities such as exercise and regular blood glucose control.

Based on the Profile of the Provincial Health Office 2012, Surabaya City has pre-elderly and elderly residents (age > 60 years) of 674,051 people. Based on the results of a preliminary survey in Banyuurip Jaya residents of Putat

Jaya Subdistrict, which has 9 RW and 91 RT, the area has a somewhat high number of elderly people. The people in the elderly group suffered from various diseases, including Diabetic Mellitus⁵.

About a fifth diabetic patient were hospitalized for problems on their feet. About 60% of all people with diabetic will experience some type of foot problem, but that would remain ignored, especially in rural areas. In people with diabetic, high blood sugar levels cause some problems on the feet because the legs are vulnerable to attachment of germs, bacteria, and other microorganisms. The damage to the feet commonly experienced by diabetics are damages to feet nerves and poor blood flow on the feet. These conditions will add to the problems in diabetic people, such causing injury or even infection that makes it possible wet or dry gangrene to emerge, which will likely end up in the feet being amputated.

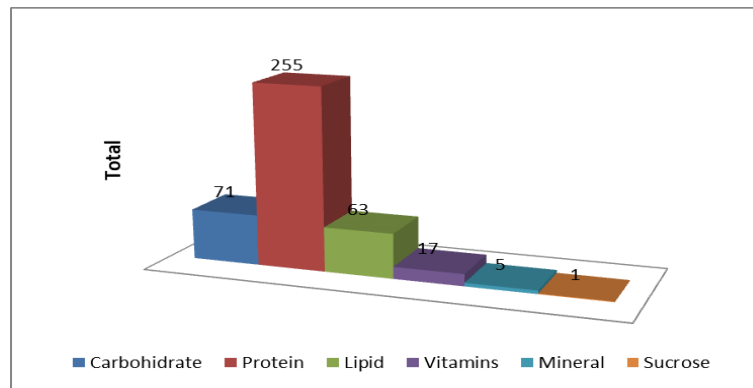


Figure 3: Types of food sources consumed by trainees for 1 month.

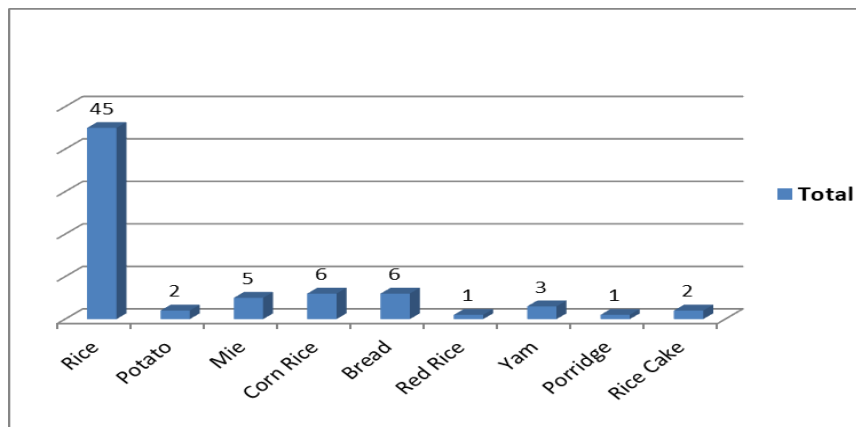


Figure 4: Types of carbohydrates consumed by trainees for 1 month

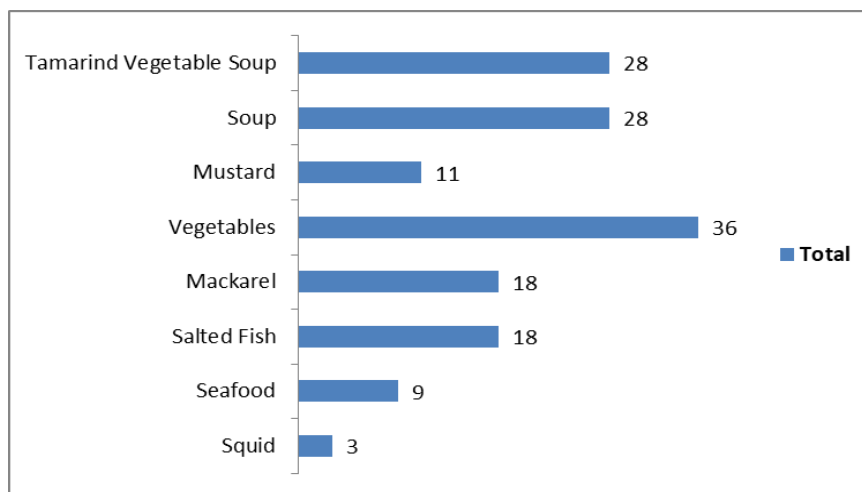


Figure 5: Types of proteins consumed by trainees for 1 month.

To avoid the condition of the feet from the emergence comorbidities or complications since the most critical effects often involve feet, the application of lotion foot care to prevent the skin of the patient to be dry, which condition give rise potential irritation and ultimately vulnerability to damages to the feet. The lotion foot care production training is very important as a form of care and prevention against foot damage in diabetic people among the general public, as well as to increase public understanding about diabetic.

Many of the elderly people with Diabetic Mellitus in Banyuurip Jaya community do not know how to treat

diabetic foot ulcers, and only a few people with Diabetic Mellitus know how to treat the condition. In addition, the promotion of healthy food for DM patients is also still not widely known by the elderly.

This study will focus on increasing the awareness of the diabetic elderly people without reducing the education related to healthy foods that should be consumed by involving the family of diabetic. This study will look into the use of anti diabetic drugs, patient compliance in healthy food consumption, and the success of lotion foot care use in Banyuurip Jaya residents in controlling blood

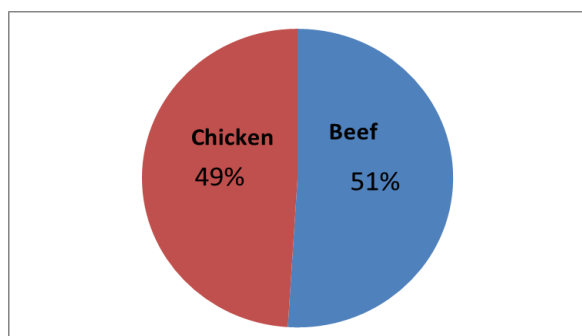


Figure 6: Types of fats consumed by trainees for 1 month.

glucose levels, and the increase of awareness and knowledge.

MATERIALS AND METHODS

Materials: Records of patient profiles, comorbidities, drug consumption profiles, and blood glucose levels.

Instruments: Questionnaires, logbooks, and statistical data processors.

Method: Sampling was performed on 60 patients who participated in the training.

Training on the introduction of DM and anti diabetic drugs, healthy food training, and training on lotion foot care production. Blood glucose measurement was performed twice, once before the participants were given training and once after the training. All observations and testimonies were recorded.

Data Analysis

Data analysis was performed based on collected logbook, pre- and post-test results processed from the trainees. A statistical test using paired T-Test was conducted to determine the relation of trainee knowledge before and after training and blood glucose level before and after training.

RESULTS AND DISCUSSION

Patient Demography: Demographic data of patients involved in this study were taken from 60 people with DM. Female patients amounted to 85% of the total, and the remaining 15% were male. The majority age range was 61-70 years (46.67%), and almost all of the patients had a history of diabetic (90%). The demographic table is shown in Table 1.

Table 1 showed that women respondents comprise the majority diabetic patients. This was because of the higher physical risk of women gaining higher body mass index, in addition to premenstrual post-menopause syndromes that make body fat to be easily accumulated due to hormonal processes⁶.

Table 2 described that the disease suffered by the majority on training participants is indeed diabetic, followed by hypertension (5%) and high cholesterol (3.37%), which were generally diseases that affected many elderly people.

Table 3 shows the history of drugs consumed by training participants, the majority of which are also antidiabetic drugs such as metformin (40%), glimepiride (33.37%) and insulin (6.67%). This has a correlation with the

history of the disease most contacted by the the trainees, which is diabetic.

In addition to the above drugs, the following are the types of drugs consumed by trainees in addition to anti diabetic drugs, as well as analgesics, and anti-hypertension, considering that most of the trainees are in the elderly group (Figure 1). The complete data of the drugs consumed by trainees in 1 month is described in table 4. The results of the change of knowledge comprehension from pre-test and post-test can be seen in figure 2. Pre-test evaluation showed a high degree of uncertainty in the participants before training. After the training were given, an increased understanding is seen in the post-test (Figure 2).

he statistical test using paired T-Test test yielded the result that there was a relationship of increment between the knowledge of the training participants before and after the training was presented with $p = 0.002$ ($p < 0.05$).

In addition to pre- and post-test assessments, the measurement of blood glucose levels also functioned as a parameter of increased knowledge and changes in behaviors of diabetic people after training on diabetic, its complications, healthy foods, anti diabetic, drugs and how to treat diabetic and prevent it. The results of measurement of blood glucose levels showed decreased blood glucose levels of trainees. Blood glucose is considered controlled if its level is under 200 mg/dL for random blood glucose level. After 1 month of training and recording of food consumed, glucose levels at the time of checking decreased from 16 people with >300 mg/dL glucose to 5 people. Similarly, the number of participants whose blood sugar levels were between 100-200 mg/dL increased after 1 month, meaning that the number of participants whose sugar content decreased from >300 mg/dL were more numerous. An interesting finding is that after being analyzed by a statistical test using paired T-Test, the data showed that there was no association or change between blood glucose levels before and after training ($p > 0.05$) (Table 5). Some possible causes include blood glucose levels within 1 month of monitoring has not significantly decreased, only experienced controlled conditions, and people were still adapting to healthy lifestyle recently introduced during the training. In addition, there might still be patients who were not able to use their anti diabetic drugs appropriately. A time of monitoring of longer 1 month is recommended for further research in order to observe more details of significant changes in blood glucose levels.

In the log book, some data of type of food consumption of DM patients training participants for 1 month of monitoring were also obtained. It can be seen from the results in Figure 3 that the largest amount of consumption was in carbohydrates, proteins, and fats. The details of the types of carbohydrates, proteins, and fats consumed by the trainees can be seen in figure 4-6.

Although food data was obtained, it does not mean that food is closely related to blood glucose control. This was similar to the studies conducted^{7,8}, in which drug intake, food intake, and physical activity were statistically not

associated with blood control. Studies conducted^{9,10} with some examples of physical activity as well as¹¹ examined the effect of aerobic exercise on the decrease of blood glucose in patients with type 2 diabetic. This can be recommended to be studied further alongside other types of physical activities.

The overall results of this study showed an increase in public awareness about the prevention of diabetic and its complications. The understanding the types of healthy foods for prevention and diabetic must also be regarded. In addition, the community has also understood the use of lotion foot care for preventive skin care so as not becoming dry, itching and even wounding and other complications. Various positive testimonies and comments from DM patients suggest that this study has provided great benefits, especially on the health of residents who suffer from DM. Further research regarding behavioral change of DM patients to maintain care and prevention against DM complications, as well as research regarding the effect of comorbid disease type, anti diabetic drug use behavior, and type of physical activity, are recommended to be analyzed for correlation with the blood glucose level control.

CONCLUSION

This study has provided results and benefits that can be experienced by the residents who attended especially diabetic patients and their families. The significant result of increased understanding of DM, healthy foods, antidiabetic drugs, and preventions that were demonstrated by residents who suffered from DM. The positive effect of the use of lotion foot care include more moisturized skin and the reduction of irritation itching. Several suggested follow-up studies include the effect of DM comorbid diseases, types of physical activity, and the way anti diabetic drugs are used to control blood glucose levels.

ACKNOWLEDGEMENTS

Authors would like to thank Universitas Airlangga and Faculty of Pharmacy for all supports and facilities during this research.

REFERENCES

1. Sutanegara D1, Budhiarta AA. The epidemiology and management of diabetes mellitus in Indonesia, *Diabetes Res Clin Pract.* 2000; 50 Suppl 2:S9- S16.
2. Biro Pusat Statistik. Laporan Sosial Indonesia, Jakarta, Biro Pusat Statistik, 2006.
3. David R. Whiting, Leonor Guariguata, Clara Weil, Jonathan Shaw, IDF Diabetes Atlas: Global estimates of the prevalence of diabetes for 2011 and 2030, *Diabetes Research and Clinical Practice*, 94: 311-321
4. Smeltzer, SC, and Bare BG. *Medical Surgical Nursing Textbook*, Brunner & Suddarth, Jakarta, EGC, 2008.
5. PERKENI (Indonesia Association of Endocrinology), *Management of Diabetic Mellitus Type 2 in Indonesia*, Jakarta, CV Aksara Buana, 2002.
6. Irawan, Dedi. Prevalence dan risk factor of diabetes mellitus type 2 at urban area in Indonesia (data analysis of risekdas 2007), Universitas Indonesia, 2010.
7. Jui-Hua Huang, Fu-Chou Cheng, Leih-Ching Tsai, Ning-Yuean Lee, and Yi-Fa Lu, Appropriate physical activity and dietary intake achieve optimal metabolic control in older type 2 diabetes patients, *J Diabetes Investig.* 2014 Jul; 5(4): 418–427.
8. Liang Chen, Jian-HaoPei, Jian Kuang, Hong-Mei Chen, Zhong Chen, Zhong-Wen Li, Hua-Zhang Yang. Effect of lifestyle intervention in patients with type 2 diabetes: A meta-analysis, *Metabolism*, Volume 64, Issue 2, February 2015, Pages 338-347
9. Gardner AW, Katzel LI, Sorkin JD, Bradham DD, Hochberg MC, Flinn WR, Goldberg AP. Exercise rehabilitation improves functional outcomes and peripheral circulation in patients with intermittent claudication: a randomized controlled trial. *Journal of the American Geriatrics Society* 2001; 49(6): 755.
10. Shery RC, Ronald JS, Bo Fernhall, Judith, GR, Bryan JB, Richard RR, Lisa C, Ann LA, Barry B. Exercise And Type 2 Diabetic, *Diabetic Care* 2010; 33: e147–e167.
11. Huimin Yan, Antonio Prista, Sushant M. Ranadive, Albertino Damasceno, Paula Caupers, Jill A. Kanaley, and Bo Fernhall, Effect of Aerobic Training on Glucose Control and Blood Pressure in T2DDM East African Males, *ISRN Endocrinology*, Volume 2014, Article ID 864897, 6 pages.