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## THE EFFECT OF DIABETIC FEET SPA THERAPY TO BLOOD GLUCOSE LEVEL AND SLEEP QUALITY OF DIABETES MELLITUS PATIENT

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### ABSTRACT

**Background:** Diabetes Mellitus (DM) is one of metabolic disease disorder marked by the emergence of hyperglycemia. The effect of hyperglycemia is the blood glucose going up and sleep disorder. The non-pharmacological management can be done is diabetic foot spa therapy to prevent hyperglycemia.

**Objective:** The purpose of this study is analyzes the effect of diabetic foot spa to blood glucose and sleep quality of DM patient.

**Methods:** This study employing Quasy Experiment pre post control group design method. Population in this study are 41-50 years old of DM Type 2 patients. Sample that used are 60 respondents, then divided into intervention group and control group, sampling technique with simple random sampling. Data collection applied diabetic foot spa observation sheet; instrument that used is glucometer to assess blood glucose level and assess sleep quality using PQSI questionnaire. Data analyzed with Wilcoxon and t test with  $\alpha = 0.05$ .

**Results:** Result of the study showed that there are differences on sleep quality on group who given intervention diabetic foot spa and control group p value = 0,000 <  $\alpha$  (0,05) and finding a difference on blood glucose level to group who given diabetic foot spa intervention and control group (t = 12,34; p value = 0,000).

**Conclusion:** Diabetic foot spa able to smoothing the blood circulation, lowering muscle tone stiffness, relax, feel refresh, analgesic and sedative effect. Those effect able to improving blood glucose level and sleep quality. Diabetic foot spa is recommendable for non-pharmacological therapy in sleep quality and blood glucose level on patient DM type 2.

**Key words:** Diabetic foot spa, blood glucose level, sleep quality.

### INTRODUCTION

Metabolic disease disorders one of them is Diabetes Mellitus (DM) marked with the emergence of hyperglycemia cause the insulin secretion is disturbed, and or increasing cellular insulin resistance. Chronic hyperglycemia and diabetic mellitus metabolic disorder cause tissue and organs damage, like sighting, urinary system, nerves, and vascular system. Diabetic ulcer as DM complication over the skin, began with numbness and tingling feels.

Symptoms or signs of the DM disease leading to patient feel uncomfortable because that clinical symptoms frequently occur at night then it can be disturb the patient's sleep (Taub and Redeker, 2008).

In 2014, DM prevalence over the world in group 40-59 years old reached to 387 million peoples. DM patient in Indonesia estimated as high as 10 million positioned Indonesia in the 7<sup>th</sup> highest rank in the world after China, India, USA, Brazil, Russia and Mexico (IDF, 2015). Based on Riskesdas (2018), East Java

ranked 5<sup>th</sup> highest of DM. Riskesdas (2018) stated that East Java ranked 5<sup>th</sup> highest of DM. In 2013, data of Surabaya Health Agency showed that as many as 21.729 increase to 26.613 patients in 2013 (Profile of Surabaya Health Agency, 2014).

Hyperglycemia going on prolong will cause complication and other disorder metabolism. Patient of type 2 DM having clinical and physical symptoms that leading to sleep disorder. Clinical symptoms can be skin itching, polyuria, polyphagia, and polydipsia, while physic symptoms are stress, emotional disorder, or even cognitive. Sleep disorder effect on frequent awake up and difficult start to sleep again. This sleep distress finally causing sleep quality disorder (Gustimigo, 2015). Sleep quality disorder trigger endocrine and metabolism disorders such glucose tolerance anomaly, insulin resistance, as well as response lack to insulin (Caple and Grose, 2011). Sleep disorder NREM (Non-Rapid Eye Movements) for 2 days instigate insulin sensitive decrease to 25% (Spiegel, et al., 2009).

Various intervention performed to prevent, to treatment and controlling the complication incidence in non-pharmacological management for DM patients. Sleep disorder in DM patients is preventable by doing feet treatment. Warm water therapy is useful to smoothing blood circulation, reduce muscle tonus stiffness, produce relax sensation, stimulate periphery nerves to make refresh sensation, analgesic, and sedative effect (Priyanto, 2012). Diabetic feet Spa as feet treatment activity series within found feet exercise activity, cleaning with warm water and massage (Purwanti, 2013). This is conformed with the objective of Indonesia DM control program that is controlling risk factors so lowering pain number, disability, and mortality that caused by DM with exercise (Ministry of Youth and Sport of

Republic Indonesia KEMENPORA RI, 2010).

By reason of above phenomenon, the writer interested in make a study about the effect of diabetic feet Spa on sleep quality in diabetes mellitus patient di Waru Public Health Center Sidoarjo. The objective of this research to analyses the effect of diabetic feet Spa on sleep quality in diabetes mellitus patient di Waru Public Health Center Sidoarjo.

## METHODS

### *Study Design*

This research methodology applies Quasy Experiment pre-post control group design type.

### *Setting*

Location of the research in Waru Public Health center, Waru, Sidoarjo.

### *Research Subject*

Population of this study are 41-50 years old of diabetes mellitus type 2 in Waru Public Health Center Sidoarjo about 170 respondents, sample that used are 30 interventions and 30 controls, who eligible inclusion criteria that is patients of DM type 2 who does not have disorder in lower extremities like diabetic ulcus, unable to walk, fracture on the leg, age 41-60 years old, blood glucose level less than 600 mg% when performed sample selection, contracted diabetes mellitus less than 5 years and not having chronic disease, willing to be respondent. This study using simple random sampling.

### *Instruments*

Independent variable in this study is diabetic feet Spa while dependent variable is sleep quality. Instrument that used to measure the diabetic feet Spa is observation sheet of diabetic feet Spa, measure the blood glucose level is glucometer, while

instrument to measure sleep quality is PQSI (Pittsburg Sleep Quality Index) questionnaires.

#### Data Analysis

Data analyzed with Wilcoxon and t test with  $\alpha = 0.05$ .

#### Ethical Consideration

This research has gone through an ethical test from Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama, Surabaya and obtained permission from National Unity and Politics of Sidoarjo Regency. The authors confirmed that all respondents had obtained appropriate informed consent.

## RESULTS

### *Before and After Blood Glucose Level Given Diabetic Feet Spa Intervention*

**Table 1.** Difference before and after level given diabetic feet Spa intervention in intervention and control groups in Waru Public Health Center Sidoarjo in 2019 (n = 60).

| Group        | n* | Before intervention |         | t     | p value | After intervention |        | t      | p value |
|--------------|----|---------------------|---------|-------|---------|--------------------|--------|--------|---------|
|              |    | Mean                | SD      |       |         | Mean               | SD     |        |         |
| Intervention | 30 | 289.23              | 99.524  | 0.456 | 0.651   | 124.57             | 33.056 | -5.950 | 0.000   |
| Control      | 30 | 275.90              | 109.499 |       |         | 283.50             | 99.255 |        |         |

Based on table 1, it found that no differences mean significantly of blood glucose level before given diabetic feet Spa intervention in intervention group with glucose level before given diabetic feet Spa intervention on control group ( $t = 0,456$ ;  $p$ -value = 0,651). Blood glucose level data taken from intervention group and control group is homogenic. The differences mean significantly of blood glucose level after given diabetic feet Spa intervention in intervention group with glucose level after

given diabetic feet Spa intervention in control group ( $t = -5,950$ ;  $p$ -value = 0,000).

### *Differences on Sleep Quality Before and After Given Diabetic Feet Spa*

**Table 2.** Differences on sleep quality before and after given diabetic feet Spa intervention on intervention group and control group in Waru Public Health Center Sidoarjo.

| Kelompok     | n* | Before intervention |       | p value | After intervention |       | p value |
|--------------|----|---------------------|-------|---------|--------------------|-------|---------|
|              |    | Mean                | SD    |         | Mean               | SD    |         |
| Intervention | 30 | 2,50                | 0,630 | 0,107   | 3,00               | 0,000 | 0,008   |
| Control      | 30 | 2,70                | 0,466 |         | 2,77               | 0,430 |         |

Based on table 2, it shown that no differences mean significantly of sleep quality before given diabetic feet Spa intervention on intervention group with sleep quality before given diabetic feet Spa intervention on control group ( $p$ -value = 0,107). Present that sleep quality data taken from intervention group and control group is homogenic. The differences mean significantly of sleep quality after given diabetic feet Spa intervention on intervention group with sleep quality after given diabetic feet Spa intervention on control group ( $p$ -value = 0,008).

## DISCUSSION

### *Before and After Blood Glucose Level Given Diabetic Feet Spa Intervention*

Founded the results disclosed the mean difference in blood glucose levels before and after the intervention where in the intervention group higher than the control group. This reveals that respondents who were given intervention or diabetic feet SPA treatment had low blood glucose levels. The low blood glucose level values indicate an improvement in the blood glucose levels after diabetic feet SPA is performed. Decrease in blood glucose

levels indicates a decrease in the level of interference due to DM, because the severity of diabetes mellitus will be indicated by the presence of blood glucose levels which are higher than the normal threshold value.

Decreased blood glucose levels are also presented in the study by Priyanto (2012) regarding the effect of feet exercises on decreasing blood sugar levels following feet exercises in Magelang. The results showed that the majority of DM exercise participants had decreased blood glucose levels.

The core likeness of the study confirms blood glucose decrease, if patients who have diabetes mellitus are given exercise training or activities where gymnastics is one of a series of activities of the Diabetic Feet SPA. The distinction focal in research found with this study is that gymnastics carried out in Priyanto's research is diabetes exercise while in this study the diabetic feet SPA in which there is a diabetes exercise intervention in SPA therapy as well.

From on the results above, it indicates that blood glucose levels in people with DM can be more controlled or reduced by doing activities. The activities carried out are carried out regularly, measured and carried out properly and correctly. Spa Therapy Diabetic feet that is done consistently, will be able to stimulate blood vessels more smoothly and be able to be shown until sweating will press the pancreas to produce insulin to reduce blood glucose levels in the body.

#### *Differences on Sleep Quality Before and After Given Diabetic Feet Spa*

Founded the results disclosed the mean difference in quality of sleep before and after the intervention where the intervention group higher than the control group. This illustrates that respondents who were given intervention/treatment had

relatively better sleep quality than respondents who did not get diabetic feet Spa treatment.

The results of this study are in accordance with previous studies namely Chandramolesswaran & Govardhan (2011), SPA therapy procedures performed by performing a combination of soaking water with a temperature of 380 C to 400C and massage. Chandramolesswaran & Govardhan explained that blood vessel vasodilation can be achieved by keeping blood vessels warm, avoiding cold conditions, reducing emotional stress and preventing vasocinricion. The results of the same study also explained that soaking the feet using warm water can result in blood vasodilation and dilated arterial lumen, thereby reducing blood flow resistance which will increase blood flow (Chandramolesswaran & Govardhan, 2011).

#### **CONCLUSION**

Diabetic feet Spa able to smoothing the blood circulation, lowering muscle tone stiffness, relax, feel refresh, analgesic and sedative effect. Those effect able to improving blood glucose level and sleep quality. Diabetic feet spa is recommendable for non-pharmacological therapy in sleep quality and blood glucose level on patient DM type 2.

#### **SUGGESTION**

Diabetic feet spa is recommendable for non-pharmacological therapy in sleep quality and blood glucose level on patient DM type 2.

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