

The Effect of Acupressure on Fasting Blood Glucose Levels in Clients with Type II Diabetes Mellitus

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Abstract

Diabetes mellitus is a disease that has a characteristic signs in the form of an increase in glucose levels exceeding normal range. The prevalence of diabetes mellitus is increasing significantly. Currently, the management of diet, exercise and use therapy pharmacological therapy are option in the management of diabetes mellitus. In addition to these therapies, there are complementary therapies such as acupressure. The purpose of this study was to prove the acupressure intervention in influencing fasting blood glucose levels. This research was a quasi-experimental study with a nonequivalent control group design with pre – test post – test. This study had 38 respondents who were divided into 2 groups and were taken using a consecutive sampling techniques. This study was conducted from April 7th 2021 – May 9th 2021. The pre – test and post -test difference test used the wilcoxon test. The different test between groups used Man – Whitney test and Independent – t test. Study This showed that there were significant differences before and after treatment in all groups $p = < 0.05$. The results of the post-test differences between groups also showed $p = 0.012$ which shows that there are meaningful differences between post-tests in groups intervention and control groups. Complementary therapy in the form of proven acupressure can decrease fasting blood glucose in type II diabetes mellitus patients, and complementary therapy in the form of acupressure can used for decrease fasting blood glucose levels in type II diabetes mellitus patients.

Keywords : Diabetes Mellitus Type II, Acupressure, Fasting Blood Glucose

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BACKGROUND

Diabetes mellitus is a diseases that has a characteristic sign in the form of an increase in blood glucose levels exceeding normal range (Listyarini and Fadilah 2017). The prevalence of people with diabetes mellitus in the world is increasing significantly. The latest study shows that the number of sufferers with diabetes mellitus in the world reaches 425 million people, and is even predicted to continue to increase to reach 629 million in 2045 (Jumari, Waluyo et al. 2019) .

Based on RISKESDAS data in 2018 the prevalence of people with diabetes mellitus in Indonesia 2018 was 2.0 %. The results shows that there is an increase in the number of sufferers with diabetes mellitus from the previous year which only showed 1.5% (Kemenkes RI 2018). Based on these data, Indonesia is a country with the sixth highest number of sufferers with diabetes mellitus in the world after China, India, United States, Brazil and Mexico. Diabetes mellitus in Indonesia is also referred to as the disease with the 3rd most killer predicate in Indonesia`s population (Jumari, Waluyo et al. 2019). Central Java is one of the provinces in

Indonesia with the largest population suffering from diabetes mellitus compares to other provinces in Indonesia. RISKESDAS data in 2018 showed the prevalence of clients with diabetes mellitus in Central Java reached 2.1% (Kemenkes RI 2018) . In Temanggung Regency, the number of sufferers with diabetes mellitus is 6477 clients, with details of 109 clients with type I diabetes mellitus and 6368 clients with type II diabetes mellitus. Compared to other districts and cities in Central Java, Temanggung Regency is ranked 26th out of a total of 35 districts and cities in Central Java (Prabawa et al., 2018).

The presence of high blood glucose levels can cause many complications including coronary heart disease, retinopathy, hypertension, nephropathy and gangrene (Baynes, 2015), (Carabott et al., 2021), Kowalk, Welsh et al. 2017). Therefore, it is necessary to control and treat blood glucose levels as early as possible so that these complications do not occur in the client considering that diabetes mellitus is a disease suffered by the client for life.

Currently, the management of diet food, exercise and use of antidiabetic medicine are options for managing diabetes mellitus (Jamaluddin and Prasetyo 2019). According to Listyarini and Fadilah, there are 4 pillars of intervention in dealing with the problem of diabetes mellitus, namely meal management and planning, physical exercise, administration of hypoglycemic medicine and health education. The provision of interventions based on 4 pillars of diabetes mellitus management has proven to be effective in reducing blood glucose levels in clients with diabetes mellitus, but in practice, it has not worked perfectly, this is supported by the 2018 RISKESDAS data which shows that diabetes mellitus control intervention with food control only 80.2 %, the exercise intervention shows the proportion of success is 48.1% and the diabetes mellitus intervention with medicine has a success percentage of 91% (Kemenkes RI 2018)

Some of the reasons that cause client with diabetes mellitus not to take anti-diabetic medicine include : feeling healthy, not regularly going to health facilities, taking traditional medicine, often forgetting, cannot stand the side effects of medicine, cannot afford to buy medicine regularly and medicine are not available in health facilities (Kemenkes RI 2018). Therefore other therapies are needed to overcome the problem of diabetes mellitus, especially high blood glucose levels.

In recent years, complementary therapies have emerged it can be used to treat high blood glucose levels in diabetes mellitus, such as reflexology and wet cupping (Zarvasi, Jaber et al. 2018, Jumari, Waluyo et al. 2019). Other complementary therapies that can be applied to improve blood glucose levels in patients with diabetes mellitus are Chinese complementary therapies such as acupuncture therapy, acupressure therapy, herbs and qi gong therapy (Jumari, Waluyo et al. 2019).

In Temanggung regency, it was found that massage therapy is widely used by the community to treat various diseases. This phenomenon is supported by the results of interviews conducted by researchers in a preliminary study on May 1st, 2020, with a patient with diabetes mellitus named Mrs. S (55 years). The result of the interview found that the client said, "I believe if my blood glucose level decrease after a massage at a certain point because I have taken measurements using a glucometer and the blood glucose level decrease in the body because it doesn't feel weak. It's been proven a lot. Therefore, it is necessary to look for complementary therapies that have been proven to reduce blood glucose levels in clients with diabetes mellitus, but conceptually have similarities with massage therapy. One of the complementary therapies that have been proven in research in decrease blood glucose levels of clients with diabetes mellitus and has the same concept as massage therapy is complementary acupressure therapy.

Complementary medicine from China that is used in overcoming the problem of blood glucose levels in patients with diabetes mellitus is to use acupressure therapy. Acupuncture and acupressure therapy techniques are the same because they use the same meridian points. The

acupressure technique is considered more appropriate to be applied to people with diabetes mellitus because the acupressure technique used is the fingers so that it does not cause fear to the client compared to acupuncture which uses a needle in the form of a needle (Jumari, Waluyo et al. 2019). Complementary acupressure therapy was also chosen because conceptually, complementary acupressure therapy is almost the same as massage, but has been modified with emphasis on only a few acupoints (Jumari, Waluyo et al. 2019, Manek 2019). In addition, complementary acupressure therapy is also one of the complementary therapies that have minimal risk in people with diabetes mellitus (Rousdy, 2017).

Several studies have shown that acupressure therapy is more effective in decrease blood glucose levels, compared to regular treatment in the form of antidiabetic medicine (Fitrullah and Rousdy 2016, Masithoh, Ropi et al. 2016, Jamaluddin and Prasetyo 2019, Jumari, Waluyo et al. 2019). Complications due to diabetes mellitus can also be reduced because of this therapy. One of the studies that showed that the administration of acupressure was effective in reducing blood glucose levels was a study conducted by Jamaluddin and Prasetyo on acupressure therapy on blood glucose balance in Type 2 diabetes mellitus in the work area of the Jumpandang Baru Health Center Makasar. In this study, it was concluded that giving acupressure affected reducing blood glucose levels in clients with diabetes mellitus.

Similar research was also conducted by Jumari et al. The results of the study concluded that acupressure therapy affected decreaseing blood glucose levels in patients with diabetes mellitus compared to standard therapy for diabetes mellitus using anti – diabetic medicine. In this study, the administration of acupressure therapy was shown to be able to reduce current blood glucose levels in clients with diabetes mellitus within 3 weeks.

Acupressure therapy has been proven statistically effective in reducing blood glucose levels, but clinically this therapy has not been shown to have a significant effect on reducing blood glucose levels in clients with diabetes mellitus in other words, it has reached the cut of point of blood glucose levels according to WHO (World Health Organization). This is evidenced in the study of Jumari et al. which shows that before acupressure the client`s current blood glucose is 258, 88 mg / dL and after acupressure, it drops to 229, 69 mg / dL (has not reached the normal value of current blood glucose according to WHO, which is < 200 mg / dL). In this study, it can also be seen that the effect size value for acupressure therapy in this study was 0,4 or it can be concluded that acupressure therapy has a good effect on reducing blood glucose.

Based on the evaluation carried out by researchers in previous studies, it can be seen that in previous studies the acupressure intervention was carried out as a substitution intervention rather than a complementary intervention. In addition, in previous studies, the management of diabetes mellitus was not carried out thoroughly by following per under the four pillars of diabetes mellitus management

Based on the background above, the researcher is interested in conducting research entitled “The Effect of Acupressure on Fasting Blood Glucose Levels in Clients with Type II Diabetes Mellitus”.

Objective

The purpose of this study was to prove the acupressure intervention in influencing fasting blood glucose levels in clients with type II diabetes mellitus.

RESEARCH METHODS

This researchh is a quasi experiment study a nonequivalent control group design with pre – test post – test . This study was conducted from April 7th 2021 – May 9th 2021. The population in this study were clients with type II diabetes mellitus who experienced hyperglycemia in the work area of the Bulu Health Center, Temanggung Regency and participated in the PROLANIS

program. The sample in this study was taken using a consecutive sampling technique and obtained a sample of 38 samples for two groups (19 respondents / group).

In the intervention group acupressure was given for 5 minutes at points ST – 36 and SP – 6 on the left and right legs for 6 treatments within 3 weeks (1 week 2 treatments). In the intervention group, respondents still consume pharmacology therapy prescribed by a doctor. In the control group was only given standard treatment in the form of anti- hyperglycemia medicine prescribed by a doctor.

Data processing in this study was computerized using parametric and non- parametric tests. In conducting this research, the researcher pays attention to research ethics which include : informed consent, confidentiality, justice, ethical clearance and beneficence.

RESULTS AND DISCUSSION

1. Respondents Fasting Blood Glucose Level

Table 1. Blood Glucose Levels Pre and Post

Fasting Blood Glucose Levels	Intervention Group n = 19	Control Group n = 19
Fasting Blood Glucose Levels Pre - Test (mg/dL) Mean $\pm$ SD (min – max)	211.8 $\pm$ 73.5 (130 – 376)	273.05 $\pm$ 102.4 (131 – 477)
Fasting Blood Glucose Levels Post - Test (mg/dL) mean $\pm$ SD (min – max)	136.05 $\pm$ 37.2 (73 – 210)	181.3 $\pm$ 64.3 (73 – 327)

2. Hypothesis Testing

Table 2. Different Test of Pre – Test and Post Test Fasting Blood Glucose

Group		Median (Minimum – Maximum) mg/dL	p
Intervention	Pre-Test	184 (130 – 376)	0,000
	Post - Test	126 (73 – 210)	
Control	Pre-Test	218 (131 – 477)	0,000
	Post - Test	172 (73 – 327)	

Table 3. Different Test of Fasting Blood Glucose Levels in the Intervention Group and the Control Group

	Group	Median (Minimum – Maximum) mg/dL	p	
Pre-Test	Interventio n	184 (130 – 376)	0.56 3	
	Control	218 (131 – 477)		

		Mean (mg/dL)	p	Mean Difference (95% Confidence Interval of the Difference)
Post - Test	Interventio n	136, 05 (37, 2)	0.01 2	-45, 31 (-80,1 - -10,7)
	Control	181, 37 (64, 3)		

Discussion

1. The Effect of Acupressure Therapy on Fasting Blood Glucose Levels

In intervention groups, the results of the Wilcoxon test showed that H_0 was rejected ($p < 0.05$) so it was said that there was an effect of acupressure on fasting blood glucose levels of respondents in intervention group after being given acupressure treatment for 5 minutes at 2 acupoints 2 times in 1 week for 3 weeks. The results of research are by following per under the results of previous studies. Previous research on acupressure on diabetes mellitus clients conducted by Jumari, Agung Waluyo, Wati Jumaiyah and Dhea Natasha (2019), showed that acupressure was proven to reduce blood glucose levels in patients with type 2 diabetes mellitus.

Compared with the acupressure treatment in previous studies, this study was considered to be better in lowering blood glucose levels. The results of statistical analysis showed that both studies proved that complementary therapy in the form of acupressure lower blood glucose levels of client with type II diabetes mellitus, but both have not been effective in reducing blood glucose levels, because they have not reached the cut off point value set by WHO (World Health Organization).

A similar study was conducted by Maryam Jamaluddin and Wahyuni Maria Prasetyo, who said that acupressure intervention can reduce blood glucose in patients with type 2 diabetes mellitus. The results of this study are in line with the results of this study. When compared statistically both are proven to decrease glucose levels, but are not effective. Besides based on previous research, Nanda's nursing diagnosis also recommends this complementary acupressure therapy as one of the complementary therapies that nurses can do (Khusna, Sudirman et al. 2019).

Acupressure has an influence on decreasing fasting blood glucose levels in patient with type II diabetes mellitus because acupressure can stimulate neurotransmitters whose job is to carry signals to nerves or through glands so that the hypothalamus will be active (Jumari, Waluyo et al. 2019). The hypothalamus is defined as the control center of the body which is connected with a lot of nerves and the pituitary gland. The presence of stimulation in the hypothalamus will trigger it to release CRH (Corticotropin Releasing Hormone) which functions as a stimulus to the anterior pituitary gland (Sulastri and Arofi 2018). Then the pituitary gland will produce the ACTH (Adrenocorticotrophic) hormone which functions to

stimulate the adrenal gland in the zona fasciculata to produce cortisol whose main task is to control blood glucose levels through the process of increasing carbohydrates.

Providing bodily Giving the body a stimulus in the form of emphasis on the SP – 6 and ST – 36 points can produce glucose – 6 – phosphate which is one enzyme used in carbohydrates metabolism and also responds to the hypothalamus – pituitary – adrenal AXIS and produces the hormone CRF (Corticotropin Releasing Factor) so that pancreas especially B cells – Langerhan will be stimulated to secrete insulin (Syafitri, Berawi et al. 2019). In level At the cellular level, the target cell of this acupressure therapy is the glucose transporter (GLTU – 4) whose job it is to carry glucose into cells, so that a decrease in blood glucose levels will occur (Jumari, Waluyo et al. 2019) . Basically, the implementation of acupressure on clients who experience hyperglycemia diabetes mellitus is focused on the flow of energy / qi to the pituitary gland and hypothalamus.

2. Influence Intervention Standard Against Fasting Blood Sugar Levels

In the control group, the wicoxone test showed that there was a significant difference in the form of a decrease in fasting blood glucose levels of respondents before and after being given standard treatment in the form of an anti- hyperglycemic medicine in the form of metformin 500 mg. Metformin works by lowering blood glucose levels through insulin target cells in the liver, muscle, and fat by increasing the sensitivity of these cells to insulin. The anti-hyperglycemia medicine metformin also works by decreasing gluconeogenesis in the liver, thereby decreasing fasting blood glucose levels (Diani and Pulungan 2010, Katzung, Masters et al. 2012)

3. Comparison Between Group

The pre-test of blood glucose levels t-test between the two groups using the Man Whitney test showed that $p = 0,563$ ($p < 0,05$) which means that there was no significant difference in the base line data between the two groups before being given treatment, both standard treatment and treatment in the form of complementary acupressure therapy performed twice a week for 3 weeks of treatment. In the post-test data, the statistical test results with the independent t-test $p = 0,012$ which showed that there was a significant difference in the post-test data between the intervention and control groups. In this analysis, it can be seen that the use of intervention in the form of complementary acupressure therapy has a better reduction in blood glucose levels compared to those who are only given standard therapy by using anti-hyperglycemia medicine in the form of metformin. This is shown by the average value of post-test data between the two groups. In the intervention group with the provision of treatment in the form of complementary acupressure therapy, the average post-test value of fasting blood glucose levels was 136,05 mg / dL and it was only 181,3 mg / dL in the control group.

In the intervention group, the post-test showed that blood glucose levels were better than in the control group because in the intervention group, acupressure had an influence on reducing fasting blood glucose levels in type 2 diabetes mellitus patients because it can stimulate neurotransmitters which carry signals between nerves or through glands so that the hypothalamus will be active (Jumari, Waluyo et al. 2019). The stimulation of the hypothalamus will trigger it to release CRH (Corticotropin Releasing Hormone) which functions as a stimulus to the anterior pituitary gland (Sulastri and Arofi 2018). The anterior pituitary gland will produce ACTH (Adrenocorticotropic) which functions to stimulate the adrenal glands of the fasciculate zone to produce cortisol controlling blood glucose levels through the process of carbohydrate binding.

Providing stimulus at acupoint points SP – 6 and ST – 36 can produce glucose – 6 phosphate which is one of the enzymes used in carbohydrate metabolism and also responds to hypothalamus – pituitary – adrenal AXIS and produces CRF (Corticotropin Releasing Factor) so that the pancreas, especially B cell – Langerhan, will be stimulated to excrete insulin (Syafitri, Berawi et al. 2019). In this intervention group, patients were also required to continue

taking anti-hyperglycemia medicine in the form of metformin. Metformin is a medicine that works by lowering blood glucose levels through insulin target cells in the liver, muscle and fat by increasing insulin sensitivity. It also works by reducing gluconeogenesis in the liver so that blood glucose levels will decrease.

In the intervention group, it can be concluded that the treatments in reducing fasting blood glucose levels can be carried out in two ways, namely by using complementary acupressure therapy and pharmacological therapy in the form of anti-hyperglycemia medicine, so that the results obtained can be maximized.

4. Limitations Study

- a. There was no randomization in sampling because there might be treatment bias due to respondents who meet one another in the community.
- b. In this study, researchers did not control confounding variables.

CONCLUSION

The conclusion that can be drawn from this study is that the provision of complementary therapy in the form of acupressure is proven to have an effect in reducing the fasting blood glucose levels of patients with type 2 diabetes mellitus.

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