



## Research Article

# Effects of acupressure therapy period towards blood sugar level in type 2 diabetes mellitus patients at Lumajang acupressure clinic

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### ABSTRACT

Diabetes Mellitus is a worldwide metabolic disease and becomes a challenge for the health practitioner. Unfortunately, less than half of these diabetic individuals are aware of their conditions, and less than 1% of those receiving medical treatment achieve their therapeutic targets. Acupressure is an alternative method that is believed to be an effective way of treating diabetic patients with reducing symptoms and complications. This research aims to discover the effect of period acupressure therapy on blood sugar levels in type two diabetes mellitus patients in Lumajang Acupressure Clinic. It uses an observational analytic design with pre-test and post-test approach. It involved 36 participants who were split into two groups and contained 18 participants for each group. The first group received acupressure therapy for three weeks, while the second group received eight weeks. Both groups underwent acupressure at the San Yin Jiao (SP-6) acupoint for 20 minutes three times a week. All participants in both groups had their blood glucose checked before and after acupressure therapy. The results showed that the two groups were significantly different for the paired t-test and the independent t-test. The acupressure therapy period has an effect on decreasing blood sugar levels in type two diabetes mellitus patients at Lumajang acupressure clinic.



## INTRODUCTION

Diabetes mellitus is defined as the chronic failure of the metabolism function in the human body as a result of insulin deficiency. Diabetes mellitus is a worldwide metabolic disease and becomes a challenge for health practitioners (Azitha et al., 2018). According to the *International Diabetes Federation*, around 425 million adults are affected by diabetes and are expected to increase to 629 million by 2045 (World Health Organization, 2016). Indonesia has 10 million diabetic and 17,9 million prediabetic citizens. It is predicted that Indonesia will rank among the top 5 countries with diabetes mellitus in the world in 2030 (Rachmayanti et al., 2017). When not managed properly, all types of diabetes can lead to complications that affect many parts of the body, even death. The severity of symptoms is due to the type and duration of diabetes (Kharroubi, 2015). Most diabetics are in developing countries. Since 2014 Asia and Africa have the highest number of diabetes (Fitruallah & Rousdy, 2017).

The prevalence of Type 2 diabetes mellitus (T2DM) is more common than Type 1 diabetes mellitus or gestational diabetes. The prevalence of T2DM is 30-50%, while gestational diabetes is 10-25%, and the rest is DM Type 1. The proportion of T2DM cases reaches 57% of all cases of diabetes mellitus in all hospitals in East Java (Dinkes Jawa Timur, 2018). The classic diabetes symptoms such as polyuria, polydipsia, and polyphagia occur commonly in type 1 diabetes, which has a rapid development of severe hyperglycemia and type 2 diabetes with very high levels of hyperglycemia (Ramachandran, 2014). One helpful indicator of T2DM disease is high blood sugar levels. The disease can also cause neuropathy complications, which results in losing the sense of taste and increased pain in the affected part. The most common complaint is tingling. The more various complaints in

patients with T2DM, the risk of complications also increases (Meidikayanti & Wahyuni, 2017).

Unfortunately, less than half of these diabetic individuals are aware of their conditions, and less than 1% of those receiving medical treatment achieve their healing targets. One of the main factors is that they were not comfortable with medication and even used alternative medicine to cure their illness. T2DM patients tend to seek alternative therapies to reduce their blood sugar levels. Up to 64% of T2DM patients who use *Complementary and Alternative Medicine (CAM)* or alternative therapies use it to control blood sugar levels (Naja et al., 2017).

The United States National Center for Complementary and Alternative Medicine (NCCAM) introduces alternative therapies as a medical system and health care products and practices that are not currently considered routine medical care. Alternative therapies consist of various practices such as massage therapy, music therapy, hypnotherapy, laughter therapy, acupuncture, and acupressure (Fogarty et al., 2016).

Acupressure, a method derived from Traditional Chinese Medicine (TCM), is an alternative medical therapy by applying certain pressure using a finger, thumb, or an instrument to an *acupoint* in the human body. Acupressure is gaining attention in the near future. The benefits of acupressure therapy are practical, effective, and safe (Zick et al., 2016). Acupressure is an effective method for reducing blood sugar levels and helping to minimize complications in diabetic patients (Fitruallah & Rousdy, 2017). From the description above, this study aims to find out the effectiveness of acupressure therapy to reduce blood sugar levels in T2DM patients if acupressure is conducted with different time periods considering that diabetes patient continues to increase and it is difficult to find a comfortable and appropriate therapy.



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### METHODS

The design in this study was quantitative with an observational analytic design and a pre-test and post-test approach. There were two groups in this study; the first group underwent therapy for three weeks, and the second group for eight weeks. This study was conducted in Lumajang Acupressure Clinic in November 2019 for approximately eight weeks. This study population was all T2DM patients in Lumajang Acupressure Clinic, while the sample was T2DM patients who match the inclusion criteria. The sampling technique was consecutive sampling, which was part of non-probability sampling and was the best type of sampling in clinical studies (Sugiyono, 2008).

The inclusion criteria were patients aged >18 years, T2DM patients (proven by the results of laboratory examinations), patients who took *pre-test* data in  $\leq 3$  weeks of visits, patients who took *pre-test* data in  $\leq 8$  weeks of visits, patients who came for the first visit and brought the results of the laboratory examination, patients who have been receiving OHA therapy, and willing to follow research. The exclusion criteria were patients who did not complete therapy until the 3rd weeks of visit (group 3 weeks) and the 8th weeks of visit (8 weeks group), Pregnant women during the study, T2DM patients with complications, not willing to follow the research, their condition worsens so that they can not continue research and die.

The independent variable in this study was the period of acupressure therapy, while the dependent variable was blood sugar levels. The instruments that we used were a questionnaire sheet and blood sugar measuring device Easy Touch GU 'Acrylic' to measure blood sugar levels. The questionnaire consists of 7 questions: name, age, sex, frequency of exercise, OHA therapy, previous acupressure therapy, and history of suffering Diabetes Mellitus. These

tools had been tested for validity before use. When pressing the start button, it displays stip lights up on the screen, meaning the device works correctly and valid if the display on the screen is an error sign indicating there is a problem with the device or invalid, so it requires repair or replacing the battery.

The data were analyzed using univariate analysis and bivariate analysis. Univariate analysis was performed to describe each variable. Univariate analysis was about respondents' characteristics, including age, sex, frequency of exercise, OHA therapy, description of previous acupressure therapy, history of T2DM, and average values of blood sugar levels before and after acupressure therapy. Bivariate analysis in this study using unpaired t-test and paired t-test.

### RESULTS

Table 1 shows the frequency distribution for 36 patients with type 2 diabetes mellitus in Lumajang Acupressure Clinic.

From Table 2, there were differences in average *pre-test* blood sugar levels between each treatment group. The 8-week therapy group had a higher rate than the 3-week therapy group. The *post-test* data in the 3-week therapy group had a higher rate than the 8-week therapy group.

The result of the paired t-test (Table 3) was  $p < 0.05$ , which means that each treatment group presented significant differences. The mean difference in the 3-week therapy group was 45.22, while the 8-week therapy group was 83.17. The 8-week therapy group had a more significant difference than a 3-week therapy group. A normality test for difference data was performed and obtained a  $\text{sig} > 0.05$ , which indicates that the data was normally distributed.



**Table 1.** Demographic Characteristics of Type 2 Diabetes Mellitus Patients in Lumajang Acupressure Clinic

Variable	3 weeks	8 weeks	Total (%)
	f (%)	f (%)	f (%)
<b>Age</b>			
< 45 years	11 (61)	9 (50)	20 (56)
> 45 Years	7 (39)	9 (50)	16 (44)
<b>Gender</b>			
Men	11 (61)	8 (45)	19 (53)
Women	7 (39)	10 (55)	17 (47)
<b>Sports Routine</b>			
Already	11 (61)	13 (72)	24 (67)
Not already	7 (39)	5 (28)	12 (33)
<b>Complying with Diet</b>			
Already	12 (67)	16 (89)	28 (78)
Not already	6 (33)	2 (11)	8 (12)
<b>Old Suffering DMT2</b>			
< 1Year	3 (17)	2 (13)	5(14)
> 1 Year	15(83)	16 (87)	31(86)

**Table 2.** Average Blood Sugar Levels (mean ± SD) Before and After Acupressure Therapy

Blood sugar levels	N	Group	
		3 weeks	8 weeks
Pre-test	18	245,72 ± (53,672)	278 ± (55,89)
Post test	18	200,50 ± (53,672)	194,83 ± (33,064)

**Table 3.** Paired T-test Results

Group	Blood sugar level (mean ± SD)		Average difference	P-Value
	Pre-test	Post-test		
3 weeks	245,72 ± 53,672	200,50 ± 53,672	45,22	0,000*
8 weeks	278,00 ± 55,890	194,83 ± 33,064	83,17	0,000*

\*significant

**Table 4.** Unpaired T-test Results

Average difference	Group		P-Value
	3 weeks	8 weeks	
	45,22	83,17	0,036*

\*significant



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Furthermore, to determine the more effective period of therapy, an unpaired t-test was run on different average data. Before that normality test was conducted first, and the result was  $p > 0.05$  means the data has been normally distributed (attachment). In table 4,  $p < 0.05$  ( $p = 0.036$ ) is obtained, which means there is a significant difference between the average difference in blood sugar levels in 3-week and 8-week treatment groups.

## DISCUSSION

This study was conducted on 36 respondents. Characteristics of respondents, including sex, age, regular exercise, duration of suffering from T2DM, and adherence to the diet, analyzed descriptively. Based on table 1, T2DM patients at Lumajang Acupressure Clinic were dominantly men, which was contradicted with research that there were more women with T2DM than men respondents because women perceived more stress that can affect an increase in blood sugar levels (Lisanawati et al., 2015). However, the results were in line with Nordstrom that comprised 1393 participants, and type 2 diabetes prevalence was higher in men than in women (Nordström et al., 2016).

In this study, respondents were dominated by age  $< 40$  years. This result was in line with Ha's that stated there was a significant increase in the percentage of patients that were newly diagnosed with diabetes at the age of  $\leq 40$  years (Ha et al., 2018). However, it was contradicted with a study conducted by Xu that stated the percentage of type 2 diabetes was higher among older adults (age  $\geq 65$  years) (Xu et al., 2018). Respondents in this study also dominated by those who did routine exercise, so this outcome was reciprocal with Kosim's research that out of the 40 samples used, 80% of them were T2DM patients who gained routine exercise recommendations as non-pharmacological therapy in T2DM (Kosim et al., 2017). Respondents of this study were

dominated by those who were adhered to diet recommendations, which contradicted research that stated that 56% of them did not adhere to diet recommendations (Risnasari, 2014).

There was an effect on blood sugar levels after acupressure therapy. Data exhibited acupressure therapy can reduce blood sugar levels in both groups. This was in line with research that involved 60 respondents using ST-36, LIV-3, KD-3, and SP-6 *acupoint* for 20 minutes (5 minutes per *acupoint*) for 3 weeks. The study utilized fasting blood sugar as a dependent variable obtaining that acupressure can significantly reduce blood sugar levels and reduce complications in T2DM patients (Zarvasi et al., 2018). This study's results are also in line with research that exerted 30 respondents and *acupoint* ST-36 for 30 minutes within 8 weeks; the indicator was random blood sugar levels obtaining that acupressure can reduce blood sugar levels and reduce complications in T2DM patients significantly (Fitrullah & Rousdy, 2017). The mechanism contributed to these results was that acupressure could stimulate the secretion of neurotransmitters that regulate endocrine glands (pancreas) through the transmission of the nervous system and reduce blood sugar levels through the effects of relaxation and stress reduction (Zarvasi et al., 2018). In addition, the action mechanism of acupressure can also through mRNA expression pathways from GLUT2 and GCK to reduce levels of FINS and protect the morphology of pancreatic beta cells (Feng et al., 2018).

The 8-weeks therapy group had a greater average difference than the 3-weeks group (Table 4). Acupressure therapy can reduce blood sugar levels through the mechanism of nerve excitation, mRNA expression, and NO synthesis (Feng et al., 2018). If continuously occur, these three mechanisms will help reduce the production of free fatty acids, increase glucose transport into cells, and improve the



morphology of pancreatic beta cells, thereby reducing insulin resistance and blood sugar levels in T2DM patients. Unpaired t-test presented a significant difference between the mean difference of blood sugar levels in the 3-weeks acupressure group and 8-weeks acupressure group. The longer acupressure therapy is carried out, the effect will get better, wherein this study, the intended effect was decreased random blood sugar levels. The acupressure therapy with 8 weeks period of therapy is more effective than 3 weeks because it can reduce blood sugar levels more. There was a significant effect of acupressure therapy on blood sugar levels in T2DM patients. However, the decrease in blood sugar levels in this study was not only caused by acupressure, because the mechanism of insulin resistance and regulation of blood sugar levels is not a stand-alone mechanism but depends on the intervention given, the acupoint, target population, and lifestyle of the respondents.

## CONCLUSION

The period of acupressure therapy has an effect on decreasing blood sugar levels in type two diabetes mellitus patients at Lumajang acupressure clinic.

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