THE INFLUENCE OF ACUPRESSURE THERAPY AGAINST BLOOD GLUCOSE LEVELS IN PATIENTS OF TYPE 2 DIABETES MELLITUS IN THE *PROLANIS PROGRAM* (A STUDY ON HEALTH IN AMBALAWI)

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Abstract

Acupressure lowers the blood glucose level through a massage at the point of the meridian, which can trigger the calming and uplifting response in the body, having a positive effect on emotions, and causing relaxation and normalizing the body functions. However, the great influence of acupressure in the Prolanis Program has not been seen. This study aims to analyze the effect of acupressure therapy against blood glucose levels in patients of diabetes mellitus (DM) type 2, who joined a program of chronic diseases management called Prolanis Program. With quasi-experiment research design, the study was conducted at the Clinic of Ambalawi, Bima District-Indonesia. Thirty four patients with DM type 2 who have joined the Prolanis Program were selected as participants in this study using a purposive sampling method. These participants were divided into two groups: experimental group and control group. Acupressure therapy was given 3 times during 3 weeks. Each group was measured for blood glucose levels on day 6, 12, and day 18. The data were analyzed using t-test (p= 0.05). Giving therapy for three weeks to subjects with diabetes mellitus type 2 has a positive effect by lowering their blood sugar levels. Acupressure therapy as part of Prolanis Program for 3 weeks effecttively lowering the blood glucose levels in patients of type 2 of DM. Acupressure therapy has more significant effect with p value < 0.005. There are significant difference between the experiment group and the control group since the p value is 0.00.

Keywords: Acupressure, Prolanis, Diabetes Mellitus

Abstrak

Akupresur menurunkan kadar glukosa darah melalui pijatan pada titik meridian yang dapat yang memicu respon menenangkan dan membangkitkan semangat didalam tubuh, memiliki efek positif pada emosi, menyebabkan relaksasi dan normalisasi fungsi tubuh. Besar nya pengaruh akupresur pada Prolanis Program belum diketahui. Penelitian ini bertujuan menganalisis pengaruh terapi akupresur terhadap kadar glukosa darah sewaktu pada pasien diabetes melitus tipe 2 yang mengikuti Prolanis Program. Penelitian dengan desain quasi experiment dilakukan di Puskesmas Ambalawi, Kabupaten Bima, Indonesia. Tiga puluh empat responden yang tergabung dalam Prolanis Program yang menderita diabetes melitus tipe 2 dengan metode purposive sampling dibagi menjadi 2 kelompok. Terapi akupresur diberikan 3 kali selama 3 minggu. Masing-masing kelompok diukur pada kadar glukosa darah pada hari ke-6, hari ke-12 dan hari ke-18. Data dianalisis menggunakan t-test (p=0,05). Pemberian terapi akupresur dan Prolanis Program selama 3 minggu berpengaruh menurunkan kadar glukosa darah sewaktu pada pasien diabetes melitus tipe 2. Terapi akupresur lebih efektif dengan nilai signifikan p<0,005. Ada perbedaan signifikan antara kelompok intervensi dan kelompok kontrol dengan nilai (p=0,00).

Kata kunci: *Akupresur, Prolanis, diabetes melitus*

INTRODUCTION

Diabetes mellitus (DM) is a group of symptoms which is caused by high glucose levels in blood.[1] The prevalence of DM type 2 increases as you get older and associates with high insulin resistance, which is the main sign of DM type 2.[2] According to data from the IDF (International Diabetes Federation) in 2015, the total number of DM patients is 415 million people and will continue to increase until 2040 with the total caeses of 642 million people. Approximately 80% of people with DM are at from middle and low income countries.[3]

In Indonesia, DM is currently fourth chronic disease based on its prevalency. Indonesian Health Research Data Base (*Riskesdas*) in 2013, reported that the national prevalency of DM was 2.1%. An increase in the prevalence of DM was based on an interview (if they ever diagnosed and used anti-diabetic medication). Investigation by age shows that most of the sufferers of DM was at the age range 56-64 years with prevalence of 4.8% [5].

The research conducted at Nusa Tenggara Barat (NTB) in 2007 shows that the prevalency of the DM in the NTB was 1.4% (based on diagnoses by health or by the highest prevalence of symptoms) and in the Bima District, one of the districts of NTB, was 5.9%.[4] The value of the prevalency decreased in 2013 (1.3%) based on the results of the research conducted by Riskesdas in the Nusa Tenggara Barat (NTB) province.[5] Nevertheless, the highest prevalency was still held by Bima District with 2.5%. There was 38 DM patients who visited Ambalawi Clinic of Bima District in 2017 were joined Prolanis Program. Indonesia has made various attempts to cope with the increased of degenerative diseases. In the era of National health coverage (*JKN*), many efforts have done to increase health care in Indonesia, including to overcome the increase of degenerative diseases. Research by Musfirah Ahmad (2017), regarding the implementation of Prolanis program, shows that the program was effective to control the blood glucose and the total cholesterol in 40 patients with type 2 DM. It was also found that there was significant influence of the Prolanis Program in lowering the blood glucose levels during fasting ($p= 0.001$), in which HbA1c was $p = 0.001$, and total cholesterol was $p = 0.029$. [6]

Alternative treatments were done to DM patients with non-pharmacological therapy through the complementary medicine.[7] The role of complementary medicine is to maintain the balance of blood glucose levels and to improve the effect of the insulin. Therefore that damage and complicated condition do not happen.

Acupressure is a traditional Chinese therapy which is trusted capable of improving the process of healing disease and it is derived from the science of acupuncture.[8] Acupressure is a term that is used to provide stimulation with acupoints using hands or fingers with engineering or mechanical emphasis. The emphasis is done in order to replace the acupuncture needle with the aim to waging the blood circulation and energy *(Qi)* throughout the body. [9]

The manual stimulation of acupressure points has been proven to increase the production of *serotonin* and *endorphin* and can increase serum cortisol reglucose. *Endorphin* is a natural opiate that is produced within the body. It triggers the calming and uplifting response in the body, having a positive effect on emotions, causing relaxation, and normalizing body functions.[10] The acupressure is a treatment to activate neurons in the nervous system, in which it stimulates the endocrine glands and enables problematic organ. The empirical evidence of the influence of acupressure has been tested in several

studies. Masithoh *et al.* (2016) conducted an examination to 52 patients in Disease Clinic in RS Dr. Soedjono Magelang. They found that there was a difference in blood glucose levels on the intervention group and control group before and after the acupressure therapy was conducted. The mean of Indigo in the pre-intervention group was 207.12 and in the post-intervention was 207.12, and the spread mean was 56.93; whereas, in the control group, the mean value of the pre-experiment was 199.31 and the mean value of the post-experiment was 191.50; the spread mean was 11.54" Acupressure therapy was significantly effective in lowering the blood glucose levels in patients with type 2 DM (p= 0.000, α = 0.005) and the effect size was 1.6 (strong)[11]

The present study is conducted to examine the influence of acupressure on lowering the blood glucose levels in patients with DM in the Prolanis Program. The average use of acupressure therapy in a study conducted previously at one point was i.e. point ST 36 and it showed significant results, but it was not effective in lowering the blood glucose in the normal range (140mg/dl). Additionally, another study conducted regarding Prolanis Program to the patients with DM showed significant results but still did not show significances of lowering the blood glucose levels in a normal range.

The Pogram Prolanis and acupressure therapy play the same role to overcome the incidence of blood glucose levels. Acupressure therapy is performed by adding two points, namely ST 36 and soles on the feet of patients of DM on the Prolanis Program to overcome the blood gucose levels in patients of type 2 DM , and thus these are expected to lower the blood glucose levels in a normal range. Based on these description, the present study is conducted to examine the influence of acupressure therapy on blood glucose levels handling in patients of type 2 DM who joined the Prolanis Program.

METHOD

The design used in this study was *quasi-experiment*. We carried out pre-examination and post-examination to the intervention group and the control group. Acupressure therapy and the Prolanis Program were done to both the intervention group and the control group. Measurement of blood glucose levels was performed before and after giving the therapy and activity of the Prolanis Program. Then, therapeutic acupressure was done to the intervention group on point ST. 36 (Zusanli), points on the soles of the feet and Prolanis Programs. Interventions carried out for 3 times over 3 weeks, namely on day 6, day 12 and day 18, whereas in the control group was given only the Prolanis Program at the same time.

The techniques of data collection used in this research were *the non-probability sampling* and *purposive sampling*,. The choice of these techniques was based on the consideration or particular purpose, namely based on the characteristics or properties of a population already identified in advance. Identifying the characteristics of popultion was based on the consideration of researchers.[12] Normality test was done to test the hypothesis on both the treatment group and the control group using *t-test* paired in Gaussian data and *wiloxon* if the Gaussian data were not normal.[13]

RESULTS AND DISCUSSION
Results

Table 1.Data of normality of the blood glucose levels in patients with DM

Variable	Category	*p* value
Pre-*baseline*	Intervention	0,080
	Control	0,078
Day 6	Intervention	0,079
	Control	0,053
Day 12	Intervention	0,078
	Control	0,177
Day 18	Intervention	0,072
	Control	0,116

Table 1 indicates that the average blood glucose levels, on day 6, day 12, day 18 of both the intervention group and the control group *p* value is >0.05. This shows that the test of normality of the data on these two groups showed a normal Gaussian data (p > 0.05).

Table 2.The data of homogeneity test blood glucose levels in patients with DM type 2

Variable		*p* value
Blood glucose level	Pre-*baseline*	0,722
	Day-6	0,860
	Day 12	0,908
	Day 18	0,947

Table 2 shows that the result of the homogeneity test of data pre-loaded on an average blood glucose on day 6, day 12, day 18 on the intervention group or a control group *p* value > 0.05, which means there is no variant difference between both groups.

Table 3. Description of blood glucose levels before and after administration of treatment in the intervention group and the control group

Variable	Group			
	interven tion	Min-max	Control	Min-max
Pre-*base line*	157,88	138-195	164,59	149-200
Day 6	151,59	133-187	162,18	147-198
Day 12	145,41	126-180	160,47	142-196
Day 18	139,53	120-176	157,47	140-190

Table 3 shows that the average of blood glucose levels before treatment in the intervention group was 157.88 with a minimum value of 138 and a maximum of 195, in the control group is 164, 59 with a minimum value of 149 and a maximum of 200. After being given treatment, the average blood glucose level on the day 6 of the intervention group is 151.59 with a minimum value 133 and a maximum of 195, in the control group is 162.19 with a minimum value of 147 and maximum 198. On day 12, the average blood glucose level of the intervention group was 145.41 with a minimum value of 126 and a maximum of 180, the control group was 160.47 with a minimum value of 142 and a maximum of 196. Next day 18 the average level Blood glucose in the intervention group was 139.53 with a minimum value of 120 and maximum 176. The control group was 157.47 with a minimum value of 140 and a maximum of 190.

The blood glucose levels in the intervention group was lower than the control group. Then, the result on day 18 shows that the blood glucose level in the intervention group was 139.53 and in the control group was 157.47. The normal value for the blood glucose level is <140, which means that the intervention group passed through reduction process of blood glucose levels on day 18 during 3 weeks.

Table 4. Differences in the mean of blood glucose levels before and after treatment in the intervention group and control group

| Variable | Group | | | | | |
| | Intervention | | | Control | | |
	Mean	SD	*p* value	Mean	SD	*p* value
Pre-*baseline* - Day 18	157,88 139,53	15,823 15,701	0,000	164,59 157,47	13,793 14,041	0,000
Pre-baseline - Day 6	157,88 151,59	15,823 15,096	0,000	164,59 162,18	13,793 13,970	0,000
Day 6 – day 12	151,59 145,41	15,096 15,232	0,000	162,18 160,47	13,970 14,440	0,000
Day 12- day 18	145,41 139,53	15,232 15,701	0,000	160,47 157,47	14,440 14,041	0,000

Table 4 showed the results of measurement of blood glucose levels before and after treatment. In the intervention group, the result of blood glucose levels decreased from the pre-baseline to day 6, which was 151.59; then it was decreased on day 12 too, that was 145.41; and on day 18 it became 139.53. Meanwhile, control group also decreased on day 6, 12 and day 18 (162.18; 160.47; and 157.17; respectively)

From the above results, in general, the blood glucose levels of these two groups had been lower during the research. However, in the intervention group the process had been more effective compared to the control group with an average value of blood glucose levels 139.53 on day 18, which means it was lower then the levels of blood glucose within normal limits (normal values of blood glucose levels that is by <140 mg/dl).

Table 5. The effect of acupressure therapy and Prolanis Program on blood glucose levels decrease in patients with DM type 2

Variable	Group	Average ±SD	*p* value
Pre-*base line*	Intervenion Control	157,88±15,823 164,59±13,793	0,197
Day 6	Intervenion Control	151,71±15,090 162,24±13,980	0,043
Day 12	Intervenion Control	145,41±15,232 160,47±14,440	0,006
Day 18	Intervenion Control	140,00±15,728 157,47±14,014	0,002

The results of inndependent *T-test* on the intervention group for 3 times within 3 weeks showed that on day 6 (*p*= 0.03), day 12 (*p*= 0.00), and on day 18 (*p*= 0.00).

Blood glucose levels in a normal limit is of <140 mg/dl, pre-diabetes is >140<200 mg/dl, and diabetes is >200 mg/dl. Acupressure therapy was effective in

decreasing blood glucose levels by 151.71 on day 6, 12, and day 18 (151.71, 145.41, and 139.53; respectively). This result shows the effectiveness of acupressure within the Prolanis Program, which successfully reduced blood glucose levels below normal limits. The effect size which was calculated using an online effect size

calculator was 2.7, that means very strong.

Discussion

The acupressure therapy within the Prolanis Program can be lowering the blood glucose levels with 139.53 as the mean value (*p*= 0.002). Decrease in blood glucose levels was seen from day 6 with a mean of 151.71, then on day 12 by 145.41, and on day 18, the blood glucose levels experienced a decline and reached the normal limit by 139.53 (<140 mg/dl).

In this study there was a significant effectiveness of both acupressure therapy and Prolanis Program. Acupressure therapy was conducted to the respondents regularly at the ST 36 of Suzanli point and feet for 3 times on day 6, day 12, and day 18, started from pre-treatment up to the time when letter of approval established and signed by the respondents. Acupressure massage therapy could inhibit hyperlipidemia progression and restore neuropathy complications in patients of type 2 DM, who received regular medication, diet and exercises. And, this study concludes that acupressure therapy is a non-pharmacological therapy that can reduce the *progression of* diabetes mellitus.[14]

Acupoint, the electric active cell, called the *gate of energy,* easily polarizes and forms energy within the boundary, balancing the flow of existing energy *(Qi).*[8] Acupressure at a full point of the soles of the feet can increase blood circulation and *Qi, the* harmony of *yinyang,* and the secretion of neurotransmitters, thus maintaining the normal function of the human body and providing comfort. All effects resulted by acupressure can reduce blood glucose levels.[15]

Manual stimulation of acupressure points has been shown to increase production of *serotonin* and *endorphin* as well as increasing the serum cortisol reglucosation. *Endorphin* is a natural opiate that is produced in the body which triggers, responds, calms, and arouses enthusiasm in the body, having a positive effect on emotional stability, and can cause relaxation and normalization of body functions; as a result of the release of *endorphins*, blood pressure decreases and improves blood circulation.[15] Stimulation will stimulate nerve receptors, in which the stimulation will be sent to the pons section, to the gray part of the midbrain *(periaquedectus)*. Stimuli received by the *periaquedectus are* delivered to the hypothalamus, then released into the blood vessels.[16]

Zusanli Point is a general point below the gastric meridian. General point is a point that is often used in acupuncture treatment which has the effect of working in general, not only on gastric organs. Treatment at Zusanli point with modulation of low frequency and high intensity for 10-15 minutes will increase the secretion of *endorphins* and will increase stimulation at the acupuncture points as high as pancreatic organs (BL-20). Additonally, it will increase secretion of insulin and will cause blood sugar levels to be controlled systemically while being able to improve hemodynamics. The frequency of therapy is done 3 times a week for 20 minutes and is lowered according to clinical improvement and laboratory examination.[17]

Research related to the provision of acupressure therapy to blood glucose levels in patients with type 2 DM was conducted at the Polyclinic of Internal Medicine of RS Tk. II dr. Soedjono Magelang. The type of the research conducted was *quasi-experiment* using *pre-test and post-test with control group design* approach. This study shows that the mean ± SD of intervention group is 150.19 ± 28.24 with 56.93 as the mean difference. The results of the *paired sample t test* showed significant results with *p*= 0,000 (p <0.05), which means that there was an effect of giving acupressure therapy to the reduction of blood glucose levels in patients with type 2 DM. The results of *Cohen's effect size* in the research conducted by Robiul Fitri Masithoh (2014) demonstrates there was a strong influence after giving acupressure therapy to the value of *cohen's effect size* standard 1.07

(strong).

When compared it with Prolanis Program, the results of acupressure therapy were equally strong, but the effect size of acupressure and Prolanis program was greater than 1.07 (*effect size* of acupressure therapy and Prolanis Program 2.7), which means the result obtained in the previous study is smaller than *effect size* of acupressure therapy and Prolanis Program.

A related study was conducted on the effect of acupressure therapy as a convenient treatment for diabetic, with analytical epidemiology as the design experimental research and with randomized controlled trials. The statistical test showed a significant difference ($p = 0,000$) and the *the effect size was* 0.54, rather than when compared with the *effect size of the* the present study on acupressure therapy in the Prolanis Program, which had higher result.

Another study was conducted in Prolanis, entitled "Differences in Blood Glucose Levels and Nutritional Status of Patients with Type 2 Diabetes Mellitus" whose participants were not prolanists. The type of research was observational analytic using *cross-sectional*. This study found that the mean value of the Prolanis group is smaller (33.24) than the non-Prolanis group (47.76). From the results of *Mann-Whitney* test, there was a significant result by 0,000 ($p = <0.05$), which means there is an influence of Prolanis Program on blood glucose levels in patients with type 2 DM based on *Cohen's effect size,* the study has a moderate influence on thevalue of *cohen's* standard, namely by 0.08 (medium).

The results of the statistical test were equally significant (p <0.05) with research on the addition of acupressure therapy to the prolanis program. However, if we look at the *Cohen's effect size*, this study has *effect size* a smaller than the study, which means that the provision of acupressure therapy on the prolanis program has a greater effect than the prolanis program without the addition acupressure therapy.[18]

CONCLUSION

The present study has shown that blood glucose levels decreased in the intervention group of patients with type 2 DM after giving acupressure therapy integrated with Polanis program. The mean of decrease in blood glucose levels in experiment group is better than in the control group with a mean value of 140.00. This means being capable of reaching the normal blood glucose level limit.

The administration of acupressure therapy on the patients of DM type 2 in the Prolanis Program during 3 weeks has an effect on lowering the blood glucose levels with a significant value of $p<0.005$.

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