Journal of Research in Medical and Dental Science
2020, Volume 8, Issue 5, Page No: 68-73

Available Online at: www.jrmds.in
eISSN No.2347-2367: pISSN No.2347-2545

Back Massage as an Adjunctive Nursing Intervention for Management of Postprandial Blood Glucose Level in Diabetic Patients: A Randomized Controlled Trial

Atyanti Isworo[1*], Wahyu Ekowati[1], Senol Dane[2]

[1]School of Nursing, Jenderal Soedirman University, Indonesia

[2]Department of Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Nile University of Nigeria, Abuja, Nigeria

ABSTRACT

Introduction: Diabetic patients tend to have uncontrolled blood glucose level or hyperglycaemia. One of non-pharmacological therapy to resolve that problem is back massage. The application of back massage which also stimulate acupressure points on the back will make body relaxation and expected can lower blood glucose. The aim of this study was to determine the effect of back massage on postprandial blood glucose in type 2 diabetes mellitus patients.

Methods: This study was a single-blind randomized controlled trial conducted from October-December 2018 at Margono Soekarjo Hospital, Indonesia in which 40 eligible diabetic patiens were randomly assigned into intervention (n=20) and control (n=20) groups. Back massage was performed on the back (20 min per session) per day for 2 weeks.

Results: The result revealed that there was no significant difference in postprandial blood glucose level (p=0.414) between the two groups before intervention. However, after intervention the postprandial blood glucose in the 14th days in the intervention group was significantly lower than the control group (p<0,001).

Conclusions: The results showed that back massage had a positive effect on reducing the postprandial blood glucose level in diabetic patients. Therefore, back massage is recommended as part of nursing care and hospitals can use the protocols to apply this method to reduce hyperglycaemia among diabetic patients.

Key words: Back Massage, Blood glucose, Diabetes, Acupressure, Nursing care

HOW TO CITE THIS ARTICLE: Atyanti Isworo, Wahyu Ekowati, Senol DaneBack Massage as an Adjunctive Nursing Intervention for Management of Postprandial Blood Glucose Level in Diabetic Patients: A Randomized Controlled Trial, J Res Med Dent Sci, 2020, 8(5): 68-73

Corresponding author: Atyanti Isworo
e-mail ✉ : movahedian.ah@gmail.com
Received: 15/07/2020
Accepted: 17/08/2020

INTRODUCTION

The number of diabetic patients has increased from year to year. In 2016 on Global Report of Diabetes, the number of diabetic patients was 422 million and increased to 425 million in 2017. It is expected to increase to 629 million by 2045 [1]. Diabetes mellitus (DM) is a chronic disease with a long-term hyperglycaemia characteristic caused by the abnormalities of insulin absorption, insulin disorder or both [2]. A chronic hyperglycaemia if not controlled will increase the risk of body organs malfunction, such as eyes, nerves, kidneys, heart, and blood vessel [3].

To control the diabetes symptoms requires efforts such as lifestyle changes, exercise [4], nutritional management [5], and taking anti-diabetic drugs [6] as well as insulin injection [7]. However, management of diabetes requires compliance patients with DM. Unfortunately, patient compliance with diabetes management is still low. A recent study states that only 20% patients have good diabetes management [8]. Therefore, there is a growing trend towards the Complementary and Alternatives Medicine (CAM) among diabetic patients to control the complications of this disease.

CAM is a medical and health care system using products and practices that are not currently considered part of routine medical care [9]. CAM consists of various practices such as massage, music therapy, hypnotherapy, laughter therapy, acupuncture, and acupressure. The use of CAM among diabetic patients are relatively high. Khalaf, et al. stated that around 63% diabetic patients in the previous 12 months used CAM and 64% of CAM users states that they use CAM to control their diabetes condition [10].

Massage is one of the CAM therapies that are quite popular in Indonesia. According to General Council of Massage Therapist (2006) states that massage therapy consists of several movement that manipulate muscle tissue, tendon, and skin [11]. Massage has several benefits for diabetic patient, provides relaxation to the body, as well as improving the blood circulation, so it helps the wounds healing process in the skin tissue, and has a positive effect on blood glucose level [12]. Research conducted by Sajedi,

et al. reported that the intervention group with Swedish Massage for 15 minutes effectively reduced the blood glucose level (p<0001), and there was no effect in the control group (p=0.586) [13].

Furthermore, Field et al. revealed after 1 month of full body massage, blood glucose level decreased from an average 158 to 118 mg/dl [14]. Another research about full body massage in 6 patients with diabetes for 45 minutes, 3 times a week for 12 weeks showed results that 3 patients experienced a decrease in HbA1c, meanwhile the other 3 experienced an increase. Patients who experienced an elevated HbA1c have an obesity characteristic, get an insulin injection, and there is no one in the group with HbA1c improvement have these characteristic [15].

In the previous researches, massage was carried out throughout the body. However, massage can be done in certain parts of the body, such as back massage. Back massage is a development massage that is done in the back area. The correct back massage technique stimulates the circulation in the back-muscle tissue and has a sedative or relaxing effect on the body with the presence of endorphin release and a decrease in the hormone cortisol.

Furthermore, in the back area, there are 5 spots that are believed to be beneficial in diabetic patients. These spots are BL 20 (Pi Su) located in between the XI and XII ribs, these spots increase the function of the pancreas and spleen and increase the insulin sensitivity receptors on the cell surface that will maximize insulin into the body cells. The second spot is BL 22 (Wei Su) which function is to overcome the symptoms of edema, digestive disorder, and urinary problems, located in the ribs I and II. BL 23 spot (Sen Su) located in ribs II and III serves to overcome polyuria in diabetic patients. The next spot is BL 15 (Sin Su) is believed to be able to improve blurred vision due to diabetes complications, located in ribs V and VI. The fifth spot is BL 18 (Gan Shu) which will increase the activity of liver function for glucose reserves, this point is in the ribs VII and VIII [16].

METHODS

Study design and setting

This study is a clinical trial registered at Margono Soekarjo Hospital. The data retrieval was conducted in the patient room, named Soka room, Mawar room, and Dahlia room on October-December 2018.

Participants

The total of 40 respondents in this research was taken using the consecutive sampling technique, with the inclusion criteria of patients who awaited by his family, patients experienced mild stress, diet for diabetes patients from the hospital, able to communicate well, cooperative and willing to be a respondent. Meanwhile the exclusion criteria are the patient with vertebral bone fracture, problems with back skins surface, complications of diabetes.

Tools

The tool used to measure the postprandial blood glucose level is an Accu-Check Active glucometer. The tool used is a brand new and validated by the factory. This tool was also tested in 6 diabetic patients on 13-20 June 2018, this tool shows a consistent result. Other data collection tools are research observation sheets and respondent demographic data sheets.

Intervention

40 respondents were randomly divided into 2 groups. In both groups pre-test measurements of postprandial blood glucose levels were performed. Then in the intervention group, massage was performed. Position the pronated patient by placing a pillow under the patient's chest. The first stage, emphasis is placed on spots BL 20, BL 22, BL 23, BL 15, and BL 18 each 1 minute. Then pour the lotion on the palm of the hand and start to rub (efflurage) to all parts of the patient's back, for 4 minutes. Followed by a squeeze motion (petriase) for 4 minutes. continue with a circular motion (friction) from the shoulder down to the lower back (4 minutes). The next stage is vibration by placing the left palm under the right hand and then vibrating for 3 minutes. Finish by rubbing the massage with a rubbing stroke, from the top of the back to the lower back. On the 14th day blood glucose levels were measured, while the control group was given placebo plaster at spots BL 20, BL 22, BL 23, BL 15 and BL 18 on the 14th day postprandial blood glucose levels were measured.

Statistical analysis

From the results of the normality test using the Shapiro Wilks test, it is known that the pre-test data on blood glucose levels in the intervention group were not normally distributed (p=0.008). While the other data, such as post-test blood glucose level in the intervention group and pre and post test data in the control group were normally distributed, p=0.534; p=0.478 and p=0.788 (sequential).

To determine the difference in mean blood glucose levels before and after treatment in the intervention group using the Wilcoxon Test, whereas in the control group using a paired t test. The Mann Whitney test was used to determine the difference in mean blood glucose levels in the two groups. Data analysis using SPPS version 21.

Ethical statement

Research subjects have obtained the information about research, benefits, implementation procedures. The subjects participate voluntarily in this study. This research has also passed the ethical review from the Ethics Commission of Margono Soekarjo Hospital, Purwokerto No. 420/28201 / X / 2018.

RESULTS

Most age ranges in the range of 56-65 years, that is equal to 18 respondents from 40 respondents (45%), the

spread of Body Mass Index is even in the category of normal BMI, fat and obese. Gender was dominated by women, 55% in the intervention group and 60% in the control group. The highest education level of 18 respondents was elementary school and followed by junior high school (17 respondents). Most jobs are farmers and housewives (each of 14 respondents), this can be caused by respondents coming from rural areas and most sexes are women (Table 1).

Homogeneity test results revealed that age, Body Mass Index, education, occupation, and complications suffered by respondents were homogeneous for both groups ($p>0.05$).

The mean blood glucose level before treatment in the intervention group was 179.02 mg/dl, after 14 days, the average blood glucose level decreased at 162.50 mg/dl. Wilcoxon test results showed $p<0.001$ which means that there are significant differences between blood glucose levels before and after treatment in the intervention group. However, the results in the control group showed that the value of $p=0.444$ (Table 2). It can be concluded that there were no significant differences in blood glucose levels before and after treatment in the control group.

The group given back massage experienced a decrease in the mean of blood glucose level by 17.55 mg/dl. The minimum decrease in blood glucose level is 5 mg/dl and the maximum are 28 mg/dl. Whereas in the control group, there is an increase in blood glucose averaged 1.80 mg/dl. The table also shows that back massage can reduce blood glucose level in diabetic patients ($p<0.001$) (Table 3).

Table 1: Respondent characteristics.

Characteristic	Intervention Group		Control Group		p-value
	F	%	f	%	
Age					
36-45 years old	2	10%	4	20%	
46-55 years old	9	45%	7	35%	
56-65 years old	9	45%	9	45%	0.273
BMI					
17.0-18.4, 18.5-24.9	6	30%	6	30%	
25.0-27.0	8	40%	7	35%	
>27.0	6	30%	7	35%	0.837
Sex					
Male	9	45%	8	40%	
Female	11	55%	12	60%	1.000
Education					
Primary school	9	45%	9	45%	
Junior high school	9	45%	8	40%	
High school	2	10%	3	15%	0.662
Occupation					
Farmer	8	40%	6	30%	
Labour Worker	3	15%	3	15%	
Merchant	2	10%	3	15%	
Civil Servant	-		1	5%	
Housewives	7	35%	7	35%	0.216
Other disease/complications					
Kidney disorder	6	30%	9	45%	
Nerves disorder	2	10%	-		
Eyesight disorder	3	15%	4	20%	
Heart disorder	3	15%	2	10%	0.745

Other	6	30%	5	25%

Table 2: Differences in mean blood glucose level before and after treatment.

Group	Pre test	post-test	p value
Intervention group	179.02 (139-200)	162.50 (130-192)	<0.001
Control group	178.00 (136-210)	179.00 (143-224)	0.444

Table 3: The differences in the decreased mean blood glucose level between the intervention group and the control group.

Group	Difference in the mean blood glucose level	Min-Max	p value
Intervention group	17.55 ± 6.444	(5)-(28)	
Control group	-1.80 ± 10.309	(-14)-(15)	<0.001

DISCUSSION

In this study, the first procedure performed was to press the meridian spots, which is the BL 20, BL 22, BL 23, BL 15, and BL 18 spots, 1 minute each. The pressure on those spots is like the acupressure method. This was consisted with a recent study in which acupressure significantly reduced blood glucose level in diabetic patients compared to the control group. In acupressure therapy, non-invasive finger pressure at the meridian or acupressure spotis used to release endorphins in the brain, causing muscle relaxation, reducing pain and creating a feeling of comfort [17, 18]. (Rousdy, 2017; Sierpina & Frenkel, 2005). The body's energy flow (Qi) increases during acupressure, so it is effective for disease management [19].

Decreased blood glucose level is also thought to be caused by the relaxation in the body due to decreased cortisol level. Thus, Boghrabadi, Nikkar & Gonabadi (2017) reported that level of cortisol, adrenaline and heart rate decreased in the group given massage ($p<0.05$) [20]. Massage can change the activity of the autonomic nervous system (Autonomic Nervous System) (ANS) response from sympathetic to parasympathetic responses. In this case, cardiovascular activity and stress hormones are reduced and the person feels relaxed and comfortable. Pressure applied during therapeutic massage stimulates the activity of the vagus nerve, which in turn causes reduced the level of stress hormones and arousal physiology and then parasympathetic responses from ANS [21].

Massage also increases blood flow to the arteries, veins and regional blood flow and stroke volume. This will improve lymphatic drainage and increase serotonin, dopamine and reduce the cortisol level [22]. Therapeutic massage also stimulates the parasympathetic nervous system and decreases heart rate and respiratory rate, so it makes a person more relieved [23]. The relaxation response that occurs during massage will release the counter-regulatory stress hormones and allow the body to use insulin more effective [15, 24]. A study of 8 patients with type 1 diabetes who massaged the insulin injection area with an electrical vibrations for 3 minutes at 15 minutes after insulin injection found that the patients increased the insulin level and lower the serum glucose level [25].

Back massage can be accepted as a complementary medicine application. Many studies have reported that the most complementary medicine applications result in the decrease of psychological stress through decreasing sympathetic activity and increasing parasympathetic activity in the body and support the results of the present study. For example, it has been reported that wet cupping therapy restored sympatho-vagal imbalances and decreased psychological stress by decreasing sympathetic activity and increasing parasympathetic activity [26]. In some recent studies, it was reported that foot reflexotherapy [27], footbath therapy [28], and wet cupping therapy increases [29] beta and gamma activities of the brain EEG in young healthy humans. Also, some different complementary approaches were reported to be very useful to decrease pain in some other pain syndromes, for example, foot bathing therapy for surgical pain in women with cesarean section [30], moving dry cupping for upper shoulder and neck pain [31], wet cupping for shoulder pain and neck pain [32], foot reflexotherapy for acute low back pain [33], and combination of Effleurage massage and slow deep breathing technique for menstrual pain [34]. Besides, it has been reported that Usik Wiwitan relaxation exercise, a traditional complementary medicine application, decreased systolic and diastolic blood pressures and increased quality of life scores in elderly people [35] and decreased the anxiety of primipara pregnant women [36].

LIMITATIONS

But our study has limitations, we were not able to control the daily nutrition intake of the respondents. Although we try to limit the sample to patients who get hospital diets, researchers find it difficult to control whether patients only eat the hospital diet.

CONCLUSIONS

The results showed that back massage had a positive effect on reducing the postprandial blood glucose level in diabetic patients. Therefore, back massage is recommended as part of nursing care and hospitals can use the protocols to apply this method to reduce hyperglycaemia among diabetic patients.

DISCLOSURE OF INTEREST

There is no conflict of interest in this study.

REFERENCES

1. www.diabetesatlas.org.
2. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2011; 34:S62-S69.
3. Zimmet PZ, Magliano DJ, Herman WH, et al. Diabetes: A 21st century challenge. Lancet Diabetes Endocrinol 2014; 2:56-64.
4. Tomas-Carus P, Ortega-Alonso A, Pietilainen KH, et al. A randomized controlled trial on the effects of combined aerobic-resistance exercise on muscle strength and fatigue, glycemic control and health-related quality of life of type 2 diabetes patients. J Sports Med Phys Fitness 2016; 56:572-578.
5. Qian F, Korat AA, Malik V, et al. Metabolic effects of monounsaturated fatty acid-enriched diets compared with carbohydrate or polyunsaturated fatty acid-enriched diets in patients with type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. Diabetes Care 2016; 39:1448-1457.
6. Maruthur NM, Tseng E, Hutfless S, et al. Diabetes medications as monotherapy or metformin-based combination therapy for type 2 diabetes: a systematic review and meta-analysis. Ann Intern Med 2016; 164:740-751.
7. American Diabetes Association. Standards of medical care in diabetes-2016, diabetes care. J Clin Applied Res Edu 2016; 39.
8. Marinho FS, Moram CBM, Rodrigues PC, et al. Treatment adherence and its associated factors in patients with type 2 diabetes: Results from the rio de janeiro type 2 diabetes cohort study. J Diabetes Res 2018; 2018:8970196.
9. Peregoy JA, Clarke TC, Jones LI, et al. Regional variation in use of complementary health approaches by U.S. adults. NCHS Data Brief 2014; 146:1-8.
10. Khalaf AJ, Whitford DL. The use of complementary and alternative medicine by patients with diabetes mellitus in Bahrain: A cross-sectional study. BMC Complement Altern Med 2010; 10:35.
11. www.gemt.org.uk
12. Adams R, White B, Beckett C. The effects of massage therapy on pain management in the acute care setting. Int J Ther Massage Bodywork 2010; 3:4-11.
13. Sajedi F, Kashaninia Z, Hoseinzadeh S, et al. How effective is Swedish massage on blood glucose level in children with diabetes mellitus?. Acta Med Iran 2011; 49:592-597.
14. Field T, Hernandez-Reif M, LaGreca A, et al. Massage therapy lowers blood glucose levels in children with diabetes mellitus. Diabetes Spectrum 1997; 10:237-239.
15. Vest G. Acupressure, breath awareness help diabetes patients. Massage Magazine 2000; 64:86.
16. Ning J, Rui L, Bingyan C, et al. Effects of electroacupuncture at "Zusanli" and "Shenshu" on GLUT2 and GCK in T2DM Rats. World Chinese Med 2017; 5:41.
17. Fitrullah RA. Effectiveness of acupressure at the zusanli (ST-36) acupoint as a comfortable treatment for diabetes mellitus: A pilot study in Indonesia. J Acupunct Meridian Stud 2017; 10:96-103.
18. Sierpina VS, Frenkel MA. Acupuncture: A clinical review. South Mediteranian J 2005; 98:330-337.
19. Song HJ, Seo HJ, Lee H, et al. Effect of self-acupressure for symptom management: a systematic review. Complement Ther Med 2015; 23:68-78.
20. Boghrabadi V, Nikkar H, Gonabadi AH. The effect of Swedish massage on fasting glucose levels, insulin resistance, cortisol, adrenaline and heart rate in women with yipe II diabetes. Biosci Biotechnol Res Communications 2017; 1:42-47.
21. Björntorp P, Holm G, Rosmond R. Hypothalamic arousal, insulin resistance and Type 2 diabetes mellitus. Diabet Med 1999; 16:373-383.
22. Lovas JM, Craig AR, Segal YD, et al. The effects of massage therapy on the human immune response in helathy adults. J Bodywork Movement Therapies 2002; 6:143-150.
23. Aourell M, Skoog M, Carleson J. Effects of Swedish massage on blood pressure. Complement Ther Clin Pract 2005; 11:242-246.
24. Field T. Massage therapy for infants and children. J Dev Behav Pediatr 1995; 16:105-111.
25. Ezzo J, Donner T, Nickols D, et al. Is massage useful in the management of diabetes: A systematic review. Diabetes Spectrum 2001; 14:218-225.
26. Arslan M, Yeşilçam N, Aydin D, et al. Wet cupping therapy restores sympathovagal imbalances in cardiac rhythm. J Altern Complement Med 2014; 20:318-321.
27. Unal C, Welcome MO, Salako M, et al. The effect of foot reflexotherapy on the dynamics of cortical oscillatory waves in healthy humans: An EEG study. Complement Ther Med 2018; 38:42-47.
28. Olanipekun A, Alhassan AK, Musa FH, et al. The effect of foot bath therapy on the dynamics of cortical oscillatory waves in healthy humans: An EEG study. J Res Med Dent Sci 2019; 7:57-61.
29. Abdullahi F, Unal C, Welcome MO, et al. Beta and gamma eeg oscillatory waves of the frontal cortex

increase after wet cupping therapy in healthy humans. J Res Med Dent Sci 2019; 7:123-130.

30. Cal E, Cakiroglu B, Kurt AN, et al. The potential beneficial effects of hand and foot bathing on vital signs in women with caesarean section. Clin Invest Med 2016; 39:S86-S88.
31. Arslan M, Yaman G, Ilhan E, et al. Moving dry cupping therapy reduces upper shoulder and neck pain in office workers. Clin Invest Med 2015; 38:E217-E220.
32. Arslan M, Gokgoz N, Dane S. The effect of traditional wet cupping on shoulder pain and neck pain: A pilot study. Complement Therapies Clin Practice 2016; 23:30-33.
33. Dane S. The effect of foot reflexotherapy on acute low back pain: A pilot study. J Res Med Dent Sci 2019; 7:13-16.
34. Ariani D, Hartiningsih SS, Sabarudin U, et al. The effectiveness of combination effleurage massage and slow deep breathing technique to decrease menstrual pain in university students. J Res Med Dent Sci 2020; 8:79-84.
35. Hartiningsih SS, Utomo B, Damayanti R, et al. Effectiveness and practicality of Usik Wiwitan relaxation to improve quality of life in elderly with hypertension in West Java. J Res Med Dent Sci 2020; 8:10-16.
36. Hartiningsih SS, Suryani, Hernawati Y, et al. Usik Wiwitan relaxation for psychological wellbeing among primipara pregnant women in Bandung. Indonesia J Res Med Dent Sci 2020; 8:44-48.