EFFECT OF FOOT REFLEXOLOGY ANDORAL HYPOGLYCEMIC DRUG ON HAEMOGLOBIN A1C IN DIABETIC TYPE 2 PERSONS

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Abstract— This study was quasi experimental research used the randomized control group pretest – posttest design, and aimed to test the effects of foot reflexology and oral hypoglycemic drug on Haemoglobin A1c in persons with type 2 diabetes, based on a complementary therapy framework. Methods and Material: The sample was selected purposively and was randomized into control 25 persons and 25 persons into experimental groups. The control group received mimicked foot reflexology (MFR) and the experimental group received true foot reflexology (TFR). Both groups receivedoral hypoglycemic drug and foot reflexology every day for 30 minutes per day for 2 months. The data were analyzed by using statistics regarding frequency, percentage, independent t-test and paired sample t-test.The results showed that TFR was significantly reduce Haemoglobin A1c better than MFR ($p < .0001$). According to the results, Foot reflexology can be use combination with medication and behavior modification for glycemic control in Diabetic Type 2 patients. It could be reduce the risk of diabetic foot ulcers and lower extremity amputation and fulfill holistic care in persons with type2 diabetes.

Index Terms— Foot reflexology, complementary and Alternative Medicine, Haemoglobin A1c, Diabetes Mellitus, Health Science.

I. INTRODUCTION

Diabetes mellitus is a chronic disease that is currently becoming a global public health issue in every country with rapidly increasing trends. In 1994, 135 million people were estimated to have diabetes mellitus worldwide. Projections estimate that approximately 300 million people around the global will have diabetes mellitus by 2024. According to a report on public health statistics concerning to top twenty causes of death in the global population in 2004, diabetes mellitus ranked 12th and it is expected to rank 7th as the cause of death in 2030 (1).

In 2000, the prevalence increased to 9.6%. The number of diabetes mellitus patients was 1.54 million people in the population group aged from 35 years and up, and the number of diabetes patients is expected to increase to 2.74 million by 2040 (2). If diabetes mellitus patients are unable to succeed at glycemic control they may be faced with complicationssuch as arterial complications as most frequently encountered complication (37.57%), followed by renal complications (12.96%), visual complications (9.25%), neurological complications (6.11%) and complications of the nervous system which is the cause of leg and foot amputations in diabetes mellitus patients (1.35%) (3)

An important complication involved in the etiology of foot ulcers is motor neuropathy which cause muscle weakness, atrophy and foot deformity with abnormal pressure on foot. Foot have repeated weight bearing in the same area causes the skin to thicken, which is a factor contributing to foot ulcers (4), and subsequent problems are loss of sensation related to decrease blood supply to the feet thereby leading to ischemia and ulcers with necrotic tissues followed by infection. These are frequently encountered complications ranked among the top reasons for hospitalization among diabetes mellitus patients (5).

Once foot ulcers have occurred, it can recurrent. The recurrence rate for foot ulcers within one year is 34% with a 61% recurrence rate within 3 years and 70% for recurrence within 5 years, respectively. In addition, the problem of foot ulcers worldwide has been responsible for leg amputations at a rate of 85% with one diabetes mellitus patient having a foot ulcer-related amputation every 30 minutes (6). Most amputee patients begin by having a small wound and the wound progresses to cell death (7). According to the data, it is evident that foot ulcers and amputation are extremely important issues and the incidence of these issues is on the rise. If the issues are unresolved or prevented ineffectively, severe problems may result in the future.

From the fact that diabetes mellitus patients remain unable to control the disease. Modern medicine remains unable to respond to all the needs of diabetes mellitus patients. It causes this group of patients to seek alternative health care to cure the disease or relieve their suffering and prevent complications. This point of view Eastern wisdom or non-pharmacological health treatments come to fulfill the gap of treatment for holistic approach. Those are the concept of complementary and alternative medicine (8) i.e. meditation training, traditional Thai massage, use of medicinal herbs, use of aromatherapyand reflexology. Foot reflexology, in particular, is the stimulation of circulating to the foot of diabetes mellitus patients to relieve loss of sensation and reduce foot pressure (9). Foot reflexology can be carried out with ease and convenience at no additional cost. If diabetes patients can perform foot reflexology in combination with the use of medication according to modern medicine treatment guidelines, it can lead to holistic treatment

(8) Foot reflexology is accepted by people and can be disseminated communities as a practice guideline (10).Most importantly, foot reflexology can eventually lead to self-sufficiency (11).

According to the literature review, foot reflexology was found to be a current form of alternative medicine and complementary therapy used to care for health, e.g. foot reflexology helps reduce blood glucose levels, numbness and foot pressure in type 2 diabetes mellitus patients(12)(9)(13) and reduce HbA_{1C} levels in the blood (14) enhance immune system and improve organ function (15).

Thus, the researcher considers the study of the effects of reflexology in type 2 diabetes mellitus.Aim to confirm the effect of true foot reflexology and Mimic foot reflexology on Haemoglobin A1c before and after intervention in both control and experimental groups.

II. METHODOLOGY

This study was quasi experimental research used the randomized control group pretest – posttest design. The size of the sampling group was determined by using Cohen's table for effect size(Cohen,1988).Power was set at .80 with the statistical significance level of .05. Next, Cohen's power table for effect size was used to obtain a sample group size of 20 people for each group. In order to protect loss of the sample group, the researcher increased the sample groups to 25 each for a total of 50 subjects. The sample was selected purposively and was randomized into control 25 persons and experimental groups 25 persons. Formed the control group received mimicked foot reflexology (MFR), and another 25 persons formed the experimental group received true foot reflexology (TFR). Both groups received foot reflexology every day for 30 minutes / day for 2 months. The population used in this study comprised of persons diagnosed with type 2 diabetes, received same medication during study, age $\geq$ 20 years, HbA1C $\geq$ 8 %, no open wound and skin disease on leg , No history of allergies to lotions or sensitivity to contact with the feet, willing to attending foot reflexology for 2 months. If the patients could not join the reflexology for example they feel triggering or do not like reflexolgy massage will be exclude from the study.

The research instrumentation used in this research was divided into 2 parts, i.e. the instruments used in data collection and the instruments used in conducting the research. The instruments used for data collection comprised a questionnaire for recording the demographic data for the sample group containing basic data on the patients, history of illness with diabetes mellitus and foot screening data. The instruments used in conducting the research included blood test for haemoglobinA1c, the reflexology equipment such as wooden stick, lotion and balm. Researcher prepared the foot reflexology handbook, and trained research assistant for 6 persons on 60 hours of reflexology course for gaining competency. On the first day, the researcher taught theory and practice by follow the video of Asst. Prof. Dr.LadavalOunprasertpong - Nichraojana. On the second day, the trainees were paired to practice without watching the video. For the practice session, the trainees were divided into 2 groups, i.e. the morning group where the first group comprising 3 trainees practiced true foot reflexology by applying pressure at certain points, and the afternoon session where the second group comprising the other 3 trainees who practiced mimic foot reflexology. Before collecting the data, a foot reflexology handbook was made by the researcher. The handbook was validated and revised according to recommendations before using in the research conducting.

The Ethics Committee of Ramathibodi Hospital, Mahidol University approved the study. We obtained written informed consent from the study participants at the selected day for recruitment. Patients were informed about the aim of the study and also about being free withdraw from the study. Moreover, we ensured them that their personal information would be managed confidentially. Patients were also ascertained that their participation in or withdrawal from the study never affect their course of treatment.

The data was analyzed by computer program package. Basic data for the sample group presented in the form of descriptive statistics, amount and percentage Comparison of difference in mean of HbA1C in between group was carried out by independent t-test. Before and after intervention group was analyzed by paired t-test.

III. RESULT

Finding the results showed that most of the sample are a female, aged between 50-59 years old. Average duration of diabetes in experimental and groups were 7.32 years and 6.64 years, respectively. There were no statistically significant differences among the study groups in terms of the demographic characteristics (P value > 0.05), indicating the similarity of the study group before intervention. The result of t-test showed that TFR in experimental group can be reduce HbA1c better than MFR in control group. As Table 1

Table1 Comparison of mean before and after massage HbA_{1c} levels between the control and experimental groups (N=50).

HbA_{1c} level (%)	Control Group (n=25)			Experimental Group (n=25)			t	p
	Min - Max	Mean	S.D.	Min - Max	Mean	S.D.		
Before massage	8.1 - 10.7	8.83	.59	8.1 -10.4	8.76	.60	-.376	.708
After massage	8.3- 10.5	9.06	.50	6.7 -8.4	7.44	.44	-12.042	.000

TRF in experimental group after 2 months of true foot reflexology can be lower HbA1c Score in Diabetic Mellitus Type 2 patients. As Table 2

Table 2 Comparison of before and after reflexology HbA_{1c} levels in the experimental group

HbA_{1c} Level (%)	Mean	S.D.	Mean difference	S.D. Mean difference	t	p
Before reflexology	8.76	.60				
			1.32	.488	13.554	.000
After reflexology	7.44	.44				

IV. DISCUSSION

This finding may be explained that foot reflexology is complementary therapy which combines with medication adherence and behavioral modification to reduce Haemoglobin A1C l levels. This finding consistent with research of SurawitSakdanuphab (2010) who found the members of the sample group who received foot reflexology to have reduced HbA1C levels with statistically significance. Since True Foot Reflexology (TRF) press on the 62 trigger points that represent our whole organs for stimulate body energy free flow through the meridian line (16). Uninterrupted energy brings good health and resulting in effective blood circulation so cells receive more nutrients and oxygen (17) (18). Then press on 26 points on the foot in order to restore homeostasis to the body's various organs and to eliminate obstructed energy flow while allowing the body to function normally and relieving stress from the body by relaxing muscles and improving circulation. When circulation is good, the body's organs receive sufficient blood supply, the adrenal gland reduces the secretion of epinephrineand norepinephrine hormones, thereby causing the blood vessels to relax as blood pressure is reduced and heart rate decelerates with decreased cortisol secretion resulting in reduced blood glucose and HbA_{1c}. In addition, 13 other points on the foot are pressed, i.e. the solar plexus, brain, pituitary gland, spine, heart, lung, diaphragm, liver, pancreas, adrenal gland, kidneys, ureter and bladder, in order to re-stimulate the points affecting lower blood glucose stimulate blood circulation can reach the cellular level, thereby resulting in improved nervous and muscular system function (19). Whereas Mimic Foot Reflexology did not concern to all of 13 points related to glycemic control. After finished reflexology session .The patients was introduced to drink warm water to get rid the toxin out at the end of reflexology session. That is the reason that we have to press on the bladder zone to stimulate bladder contraction (19).

Once blood glucose levels have been reduced, the blood vessels supplying the ends of the feet were nourished better which also led to better sensation. Moreover, foot reflexology also stimulates improved blood circulation to the ends of the feet which strengthens the peripheral tissues like a cushion against impact in the foot area, which helps minimize foot pressure (20);(21). These findings also concur with the research of YompornSakdanuphab(2010)(13) who found the sample group members who received foot reflexology have lower blood glucose levels with statistically significance.

CONCLUSION

Study finding indicate that foot reflexology is an effective intervention as a complementary therapy for glycemic control. Foot refexology should be combine with modern medicine for diabetic foot care and provide holistic care. Given the optimal benefit and safety. We recommended the training program for health care provider is necessary for implementation of foot reflexology for simplicity and safety. Curriculum specifically for foot reflexology should be taught in order to improve the capacity of health care provider for caring diabetic mellitus patients with combined methods.

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REFERENCES

[1] World Health Statistics(2008).Retrieved November 29,2008 from:World Health Organization : Web site: http://www.who.int/whosis/whostat/EN_WHS08_Full.pdf.

[2] Boonnak ,Pongarmorn (2003) .*Diabetic Treatment with insulin* in Witchayan, Apichart , PuawilaiKobchai , Nitiyanun and Wanasang, Satit (Editor) . *Textbook of Diabetes Mellitus*.Bangkok:Rearnkao Publishing.

[3] Rujinwiwat, Wanassanan, (2008). *Survillance Report in Non Communicable Disease* Retrieved 24,June,2010 : Web site: http://www.epid.moph.go.th/ncd/chronic/chronic_51_0910141504.pdf

[4] Namwongpornhom,Ampaporn and Sukdeewong, Namoi (2010) . *Diabetic foot ulcer and factor related to foot ulcer in Diabetes Mellitus Type 2*. Journal of Thai Nursing Council. 25(3) 51-61.

[5] Sureet, Pattama (2006). Foot : Problem Do not overlook in Elder Diabetic Mellitus. Journal of nursing KhonkanUniversity. 29(1), 61-68.

[6] International Diabetes Federation, (2005) cited in JaruneeNumpul, (2009). *Development in nursing guideline for diabetic foot screening and preventive diabetic foot ulcer*. Thematic paper master degree in family nurse practitioner, Graduate study, MahidolUniversity,Bangkok, Thailand.

[7] Jantharamornkul,Sakchai(2008). *Training for the trainer project in Diabetic care: Basic level.* Bangkok:Graphic 1 Advertising.

[8] Ounprasertpong, Ladaval (2008). *Systemic review:FootReflexolgy and Symptom management.* Department of Alternative Medicine.Ministry of Public Health.

[9] Phuyorit, Panida(2010). *Effect of foot reflexology on numbness and foot pressure in Diabetic Mellitus Type 2*.

Master degree thesis in Nurse Practitioner, Graduate Faculty, MahidolUniversity , Bangkok, Thailand.

[10] Winitkul, Somjai and Krajangdaen, Sunantha**,** (2006). *Development of Community Health Center and Health volunteer by using community participation*. Journal of Ramathibodi Nursing. 12(2), 151-165.

[11] Winitkul,Somjai (2009) . *Community Health Diagnosis and problem Solving.* (2nd Revised) ,4th edition. Bangkok,Thailand.

[12] Orarnrittinan,Pornuma (2009). *Case study:Effect of Foot Reflexology on Fasting Blood Sugar and Numbness in Community Diabetis Mellitus Persons. Thematic paper of master degree for Community nurse practitioner, Ramathibodi School of Nursing Graduate Faculty, Mahidol University, Bangkok,Thailand.*

[13] Sakdanupab, Yomporn (2010). *Effect of Foot Reflexology on Fasting Blood Sugar and Numbness in Diabetis Mellitus Type 2 Persons.* Thesis of master degree for Community nurse practitioner,Bangkok,Thailand.

[14] Sakdanupab,Surawit (2010). *Effect of foot reflexology on Haemoglobin A1C In Diabetic Type 2*. Journal of Alternative Medicine. *3*(2), 33-40.

[15] Stephenson,Weinrich,&Tavakoli (2001).The effects of foot reflexology on anxiety and pain patients with breast and lung cancer. *Oncology Nursing Forum, 27*(1), 67-72.

[16] Ounprasertpong, Ladaval (2005). *Development of Research Project in Complementary and Alternative Medicine in Nursing : Collaboration Research in Nursing Network.*, during 9-11 March 2005, at Chao-Paya Hotel, Bangkok,Thailand.

[17] Dougans,I&Ellis,S (2002). *The art of reflexology*.Dourest :Element Book.

[18] Kevin & Barbara Kunz (1992). *Hand and Foot reflexology a self-help guide*. New York:Firesid book.

[19] Ounprasertpong, Ladaval (2008).*Systemic review:Foot Reflexology and Symptom pain management*. Department of Alternative Medicine. Ministry of Public Health. Bangkok, Thailand.

[20] Nicharojana,O. Ladaval (2010). *Foot Reflexology for Diabetic Care. Beyond Fontier with Complementary and Alternative Medicine in Diabetic Care.* During 22-24 December 2010 at SD avenue Hotel ,Bangkok,Thailand.

[21] Ounprasertpong, Ladaval (2005). *Complementary and Alternative Medicine in Nursing Therapeutic*. Journal of Chulalongkorn Nursing. 18(3), 1-7.

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