Effect of Self-Acupoint Massage on Blood Glucose Level and Quality of Life in Older Adults With Type 2 Diabetes Mellitus

A Randomized Controlled Trial

ABSTRACT

The current study aimed to explore the effect of self-acupoint massage (SEAM) on blood glucose level and quality of life in community-dwelling older adults with type 2 diabetes mellitus (T2DM). Sixty-six older adults with T2DM were enrolled and randomly divided into observation and control groups. Participants in the control group received routine nursing interventions, whereas participants in the observation group received a SEAM intervention in addition to routine nursing interventions. After 12 weeks of SEAM, glycosylated hemoglobin (HbA1c) levels in the observation group decreased from 8.35% (*SD* = 1.84%) at baseline to 7.29% (*SD* = 1.38%) ($p < 0.01$). Total score of the Diabetes-Specific Quality of Life Scale (DSQLS) in the observation group improved from 45.96 (*SD* = 4.29) at baseline to 41.3 (*SD* = 3.89) ($p < 0.01$). The physiological dimension of the DSQLS in the observation group improved from 49.65 (*SD* = 7.33) at baseline to 38.54 (*SD* = 4.68) ($p < 0.01$). As SEAM effectively decreased older adults' HbA1c level and improved their quality of life, it can be used as a complementary approach to routine nursing interventions for community-dwelling older adults with T2DM. [*Journal of Gerontological Nursing, 45*(8), 43-48.]

Diabetes is becoming a threat to global health (International Diabetes Federation, 2017). In China, type 2 diabetes mellitus (T2DM) accounts for approximately 87% to 91% of all types of diabetes, and the incidence of young patients is on the rise, which will be a heavy economic burden on patients and the country (Gao, 2006; Wang et al., 2017). Despite the regimen of oral medication and/or insulin for T2DM, successful blood glucose control relies more on patient self-management, including diet, exercise, health education, and self-monitoring (Co et al., 2015; Hou, Li, Qiu, & Wang, 2014). However, unsuccessful blood glucose control remains a challenging problem among individuals with T2DM, due to morbidity, financial income, family situation, and employment barriers, leading to poor self-management (Wang et al., 2012; Wu et al, 2011). Older adults comprise the largest population of individuals with T2DM. Due to their long disease history, more complex comorbidity, higher insulin resistance, lower educational level, and worse physical condition, it is difficult for older adults to maintain normal blood glucose levels (Tan et al., 2017). Hence, it is essential to find alterna-

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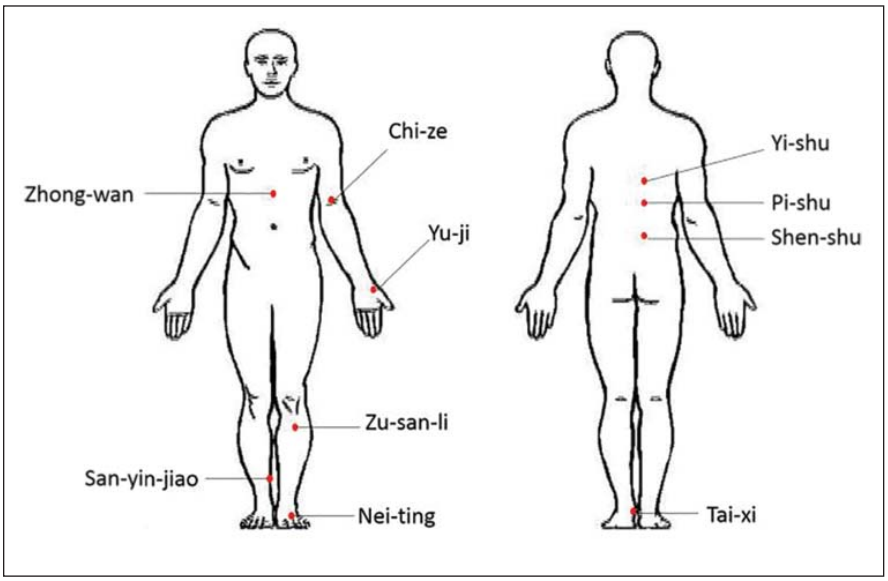

Figure 1. Schematic diagram of massage acupoints.

tive approaches to assist older adults' self-management of T2DM (Li et al., 2014).

DM is called "digestive thirst (xiaoke)" in traditional Chinese medicine. Traditional Chinese medicine treatment methods have been widely used for diabetes mellitus (Shao & Wen, 2004; Zhang, Tian, Ma, Jin, & Meng, 2015). One such treatment is acupoint meridian massage, which has strong penetrating power to relax muscles, relieve fatigue, regulate human body function, and has the effects of improving human immunity, dredging meridians, balancing "yin and yang," and prolonging life. Furthermore, acupoint meridian massage has unique advantages in improving symptoms and signs of DM. As early as 1998, a case report by Wu and Li revealed the effect of acupoint massage on blood glucose levels. The patient's fasting blood glucose (FBG) decreased from 12.6 to 6.8 mmol/L after 20 days of massage on the acupoints Yi-shu, Shen-shu, Guan-yuan, and Shao-yang, improving symptoms of thirst and water intake. Zhao and Chang (2006) applied acupoint massage in 42 patients with diabetic peripheral neuropathy and found faster neural transferring speed in the treatment group.

A close correlation was found between self-acupoint massage (SEAM) acupoints and meridians for treatment of T2DM (Feng, Fang, Wang, & Hao, 2018). The acupoint Yi-shu (EXB5) has been widely used in the clinical treatment of DM, resulting in increased antidiabetic effect (Liao et al., 2007). Pi-shu (BL20) is an acupoint for spleen essence and Qi infusion, which regulates the function of spleen migration. Massaging the Shen-shu (BL23) (kidney acupoint) can nourish kidney essence and kidney Qi infusion. Moreover, the acupoint Zhong-wan (CV12), which is located on the Ren Meridian and belongs to the route acupoint of the stomach, regulates the balance of yin and yang in the spleen and stomach (Kumar, Mooventhan, & Manjunath, 2017). The acupoints Chi-ze (LU5) and Yu-ji (LU10) are in the upper arm on the Taiyin Lung Meridian. Massaging these two acupoints can clear the lung and alleviate symptoms of thirst. The acupoints Zu-san-li (ST36) and San-yin-jiao (SP6) invigorate the spleen and stomach, strengthen the body, and cultivate the essential Qi (Zhang et al., 2014). In addition, the acupoint Tai-xi (KI3) promotes Qi and regulates yin and yang, which have benefits in controlling diabetic peripheral neuropathy, diabetic foot, and other related complications. The acupoint Nei-ting (ST44) relieves heat and clears the organs by acting on the spleen and stomach, relieving digestive symptoms of T2DM (**Figure 1**).

Limitations of previous studies of acupoint meridian massage include small sample sizes, short intervention periods, and performance of the acupoint massage by physicians or nurses, which made it difficult for older adults to continuously perform the acupoint massage when they returned home. Thus, the purpose of the current study was to explore SEAM for older adults with T2DM and examine its effect on blood glucose level and quality of life.

METHOD

Study Sample

Older adults with T2DM treated in the Department of Endocrinology of Long-Hua Hospital from April 2017 to October 2017 were recruited upon informed consent. Institutional review board approval was obtained.

Inclusion criteria were adults older than 60 diagnosed with T2DM for more than 1 year according to the World Health Organization criteria (Chinese Diabetes Society, 2014) who regularly visited the diabetes clinic for continuous treatment and had normal cognitive function. Exclusion criteria were older adults who had serious diabetes complications, exercise contraindications, and severe myocardium ischemia. Individuals were also excluded if they had DM associated with nephropathy, renal function failure, positive acetone in the urine, proliferative retinopathy, severe hypertension, or had participated in other clinical trials.

Data Collection

Using SPSS version 21.0 random number generation, participants were divided into two groups, observation and control. The observation group comprised 32 participants, of which 16 were taking medication only, six were taking insulin only, and 10 were

taking medication and insulin. The control group comprised 34 participants, of which 12 were taking medication only, six were taking insulin only, and 16 were taking medication and insulin. No significant differences in gender, age, treatment, or duration of disease were noted between groups ($p > 0.05$) (**Table 1**).

TABLE 1

CHARACTERISTICS OF STUDY SAMPLE

Characteristic	Observation Group	Control Group
Gender (n, %)		
Male	16	20
Female	16	14
Age (years) (mean, *SD*)	65.5 (5.06)	67.26 (4.81)
Course of disease (years) (mean, *SD*)	11.66 (6.45)	12.38 (7.21)

TABLE 2

STUDY INTERVENTIONS

Intervention	Observation Group	Control Group
Appropriate exercise	+	+
Diet control	+	+
Weight calculation	+	+
Caloric control	+	+
Hypoglycemic drugs	+	+
Blood sugar calculation	+	+
Mental health assessment	+	+
SEAM	+	—

Note. SEAM = self-acupoint massage. Acupuncture points included EXb5, BL20, BL23, CV12, LU5, LU10, ST36, SP6, K13, and ST44 (see Figure 1).

Routine Nursing and Self-Acupoint-Massage Interventions

Participants in the control group received routine nursing interventions, which included regular exercise and diet control. Standard body weight was calculated, and total calories were controlled by providing standardized hospital diabetic meals. Blood sugar was also recorded, which was regulated with antidiabetic drugs and/or insulin therapy. Good bedtime habits were also encouraged, such as going to bed early and getting up early. In addition, mental health was addressed, which included psychological consultation, rehabilitation, and crisis intervention, as individuals with T2DM are prone to depression and anxiety.

Participants in the observation group learned SEAM in addition to routine nursing interventions for 12 weeks (**Table 2**). There were 10 acupoints in SEAM, which included Zu-san-li (ST36), San-yin-jiao (SP6), Pi-shu (BL20), Zhong-wan (CV12), Shen-shu (BL23), Tai-xi (KI3), Nei-ting (ST44), Yi-shu (EXB5), Chi-ze (LU5), and Yu-ji (LU10). SEAM was taught by the primary nurse and self-performed by participants. The primary nurse ensured that participants had grasped the essentials of SEAM by assessing the accuracy of the acupoint location, massage time, and technique. The EXB5, BL20, and BL23 points were massaged with the metacarpophalangeal joints of both hands. The CV12 point was massaged using the patient's palm. The LU5, LU10, ST36, SP6, KI3, and ST44 points were massaged with finger pressing/lifting. Each acupoint was gently massaged for approximately 2 minutes. SEAM was to be performed between 9 and 11 a.m. or 5 and 7 p.m.

Baseline data were collected before the study and subsequently every 2 weeks after SEAM started. Nurses guided routine interventions to ensure that patients in both groups received the same interventions. However, patients in the observation group visited the diabetes clinics for continuous treatment, and the primary nurse evaluated the correctness of the massage operation and ensured the quality of the massage.

Measurements

Measurements of blood glucose level included fasting blood glucose (FBG), 2-hour postprandial blood glucose (2hPG), and glycosylated hemoglobin (HbA1c). The Diabetes-Specific Quality of Life Scale (DSQLS) was used to measure quality of life. Data were collected before and after the intervention. The DSQLS, which was designed and revised by Zhou (2008), comprises 24 items graded on a Likert-type scale, ranging from 1 (*nothing*) to 5 (*most serious*), with a total score of 120 points. The score was converted into a percentage, with 100 being the highest score. Lower scores indicated higher quality of life.

Data Analyses

Data were analyzed using SPSS 21.0. Measurement data were expressed as mean and standard deviation. FBG, 2hPG, HbA1c, and DSQLS scores before and after the intervention were compared by paired t test when normally distributed and z test when not normally distribut-

TABLE 3

FASTING BLOOD GLUCOSE (FBG), 2-HOUR POSTPRANDIAL BLOOD GLUCOSE (2HPG), AND GLYCOSYLATED HEMOGLOBIN (HBA1C) BEFORE AND AFTER THE INTERVENTION

Measure/Group	Baseline (x1)	12 Weeks (x2)	Difference (x2–x1)	*t*	*p* Value
FBG					
Observation	8.77 (1.60)	7.70 (1.27)	–1.07 (1.13)	0.94	0.35
Control	9.20 (1.90)	8.43 (1.20)	–0.77 (1.39)		
2hPG					
Observation	10.48 (1.93)	10.28 (1.84)	–0.20 (1.25)	1.51	0.14
Control	10.74 (2.08)	10.08 (1.67)	–0.66 (1.21)		
HbA1c					
Observation	8.35 (1.84)	7.29 (1.38)	0.86 (0.76)	3.33	0.001**
Control	7.84 (1.44)	7.61 (1.11)	0.24 (0.76)		

** *p < 0.01, compared with the control group after the intervention.*

TABLE 4

DIABETES-SPECIFIC QUALITY OF LIFE SCALE (DSQLS) SCORES BEFORE AND AFTER THE INTERVENTION[a]

Timepoint	Group	Total DSQLS	Physiological	Psycho/ Spiritual	Social	Therapeutic
Baseline (x1)	Observation	45.96 (4.29)	49.65 (7.33)	47.66 (7.04)	33.59 (5.99)	46.87 (10.51)
	Control	47.23 (4.87)	50.26 (7.85)	49.71 (7.66)	33.53 (5.44)	49.80 (11.04)
	t	1.119	0.325	1.13	0.046	1.103
	p value	0.267	0.746	0.263	0.964	0.274
12 weeks (x2)	Observation	41.30 (3.89)	38.54 (4.68)	45.55 (7.23)	34.84 (5.75)	46.88 (8.38)
	Control	46.81 (3.69)	50.00 (5.99)	48.90 (5.88)	33.82 (6.75)	49.02 (9.55)
	t	5.907	8.618	2.071	0.659	0.967
	p value	<0.001**	<0.001**	0.042*	0.512	0.337
d = x2 - x1	Observation	4.66 (5.12)	11.11 (7.32)	2.11 (10.02)	1.25 (8.98)	0.00 (15.43)
	Control	0.42 (4.74)	0.26 (7.31)	0.81 (7.83)	0.29 (8.16)	0.78 (14.38)
	t	3.499	6.022	0.589	0.453	0.214
	p value	0.001**	<0.001**	0.588	0.653	0.831

[a] *d (mean[SD]) = x2 (12 weeks) – x1 (baseline).*

* p < *0.05;* ** p < *0.01, compared with the control group after the intervention.*

ed. Significance level was set at 5% ($p \leq 0.05$).

RESULTS

No significant changes to FBG ($t = 0.94$, $p > 0.05$) or 2hPG ($t = 1.51$, $p > 0.05$) were noted before and after the intervention between the observation and control groups. However, a significant difference in HbA1c before and after the intervention was noted between groups ($t = 3.33$, $p < 0.05$) (**Table 3**).

Results of the DSQLS before and after the intervention revealed significant differences in the physiological dimension ($t = 6.022$, $p < 0.01$) and total quality of life ($t = 3.499$, $p < 0.05$) scores between groups. However, no significant differences in scores were noted for the psycho/spiritual, social, and therapeutic dimensions between groups ($p > 0.05$) (**Table 4**).

DISCUSSION

The current results show SEAM can help older adults with T2DM control their blood glucose level and improve their quality of life.

Blood glucose level is one of the most direct indicators of diabetes. Traditional Chinese medicine has exhibited its effectiveness on diabetes to some degree (Chang, Lin, Chi, Liu, & Cheng, 1999). In the current study, SEAM exhibited advantages over routine interventions in the reduction of HbA1c level and improved quality of life (total score and physical dimension). These results are similar to those reported by Wang (2009), which indicated that massaging the acupoints located on the back could help in blood glucose control and improve quality of life.

There are, however, potential risks to SEAM in older adults with T2DM. Because older adults have reduced subcutaneous fat and vulnerable skin, there is a possibility of impaired skin integrity (Sinclair, Abdelhafiz, & Rodríguez-Mañas, 2017). Therefore, it is important to control the strength of the massage to prevent fingernails from breaking the skin and regularly observe for changes in the skin. In addition, older adults may not remember all SEAM acupoints due to declined memory function and limited educational level. Moreover, multimorbidity and limited physical function could affect compliance levels of older adults with T2DM. These conditions lead to higher requirements of health education from diabetes nurse specialists, who need to repeatedly evaluate the correctness and quality of performance of SEAM during routine follow up visits.

CONCLUSION

SEAM is a convenient and cost-effective intervention that can be performed by older adults with T2DM to effectively decrease HbA1c levels and improve quality of life. This intervention can be added to routine visits by community nurses. Older adults and their family members can easily learn these techniques. Traditional Chinese medicine has been shown to be effective in the treatment of diabetes, thus SEAM should be considered an alternative therapy for community-dwelling older adults with T2DM.

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