The Impact of Home Visitation Program on Exercise Behaviour of Women with Type 2 Diabetes

Yasemin Gümüş Şekerci*

Department of Public Health Nursing, Mustafa Kemal University, Health School, Hatay, Turkey

*Corresponding e-mail: y.gumus36@hotmail.com

ABSTRACT

Aim: To examine the impact of home visitation program on exercise behaviour of women with type 2 diabetes. Methods: The study was performed in a district in Ankara. Power analysis was done for the sampling and the study was completed with type 2 diabetes 63 women who were determined via convenience sampling method. In the study, experimental design was used. The data are gathered with description form, exercise knowledge form and exercise self-efficacy scale. In the study, the nurse helped change the exercise behaviour of women with type 2 diabetes through home visits for six months. For the research were taken written permissions from Provincial Directorate of Health Public, University Ethics Commission and the individuals who accepted to participate in the study. Results: Sixty-three females with type 2 diabetes between 20-49 years old affiliated to community health centre completed the study. The demographic characteristics (age, education, marital status, income, employment status) of the women in intervention and control groups were similar (p>0.05). Outcomes in intervention group were significantly improved between the first and last visits included exercise knowledge, exercise self-efficacy and exercise duration (minute/day) (p<0.05). Fasting glucose level, non-fasting glucose levels and hemoglobin A1c values of the women in the intervention group significantly decreased after the home visitation program. Conclusion: This home visitation program is helpful in exercise behaviour improving among women with type 2 diabetes.

Keywords: Exercise, nurse, home visit, type 2 diabetes

INTRODUCTION

Exercise has the potential to improve the quality of life and glycaemic control decreasing metabolic risk factors of people with type 2 diabetes. People with type 2 diabetes are also at higher risk, not only because of genetics and family history, but also because of poor exercise management. Researchers demonstrate exercise management to be effective for increasing one month (short-term) exercise in people with type 1 and type 2 diabetes [1,2]. A study that investigated the effect of exercise management on glycaemic control and metabolic risk factors in people with type 2 diabetes [1].

American Heart Association recommended that diabetics should do exercise in moderate degrees for 150 min weekly [2]. However, it has been shown in the literature that women are more physically inactive than men [3,4]. Scheen [3] provided evidence for the effectiveness of exercise management for promoting exercise in the women. In a study Kitiş, et al. [4]. the incidence of metabolic syndrome and the frequency of physical inactivity were found to be very high in diabetic women. Women with type 2 diabetes report receiving less encouragement, education, and support for exercise [2-4]. Therefore, women with diabetes should encouragement for exercise management.

The study's aim was to examine impact of home visitation program on exercise behaviour of women with type 2 diabetes.

The specific purposes of this study were to: (1) determine the effects of home visiting program on improvement in exercise knowledge, exercise self-efficacy level and exercise duration (minute/day), and (2) examine whether changes in fasting and non-fasting glucose levels (2 hours after meals), and haemoglobin A1c (HgA1c) values of women before and after the home visiting intervention.

In order to achieve study goal, nurses attempt to discover an appropriate way to have diabetics acquire exercise behaviour. They should provide individuals, families, and the society with information about exercise, counselling and an active life program and motivate individuals to change their behaviour.

METHODS

Design and sample

The study was performed in a district in Ankara. Pre-test and post-test control group design was used. For the research were taken written permissions from University Ethics Commission, Provincial Directorate of Health Public and the individuals who accepted to participate in the study.

Author of this study was prepared an exercise habit gaining guide for the home visitation programs according to the exercise behaviour of the women.

To evaluate the impact of the visitation program, women were asked to complete questionnaires evaluating their exercise knowledge, self-efficacy in exercise management and exercise duration (minute/day). In addition to by community health centre evaluated fasting glucose level, non-fasting glucose levels and HgA1c values of the women before and after visitation. Women with type 2 diabetes were recorded through the community health centres to participate in this home visitation program.

Inclusion criteria were not having any health problems preventing exercise (diabetic foot, heart failure, presence of neuropathy etc.). The sample also had to meet the diabetes criteria for women in study: (1) medical diagnosis of type 2 diabetes, (2) non-insulin dependent.

In the fifth month of the study, one woman in the intervention group dropped out the study due to pregnancy and 63 women completed the study.

Home visitation program for exercise behaviour

In this study consisted of seven home visits in six month. In the intervention group, 30 days after the first visit, the second visit was conducted and then a total of seven visit at one-month intervals were held at the participants' homes. Each visit was approximately 40 to 45 min long. In the control group, data were collected at the first and last, and the last home visits performed concurrently with the intervention group (Figure 1).
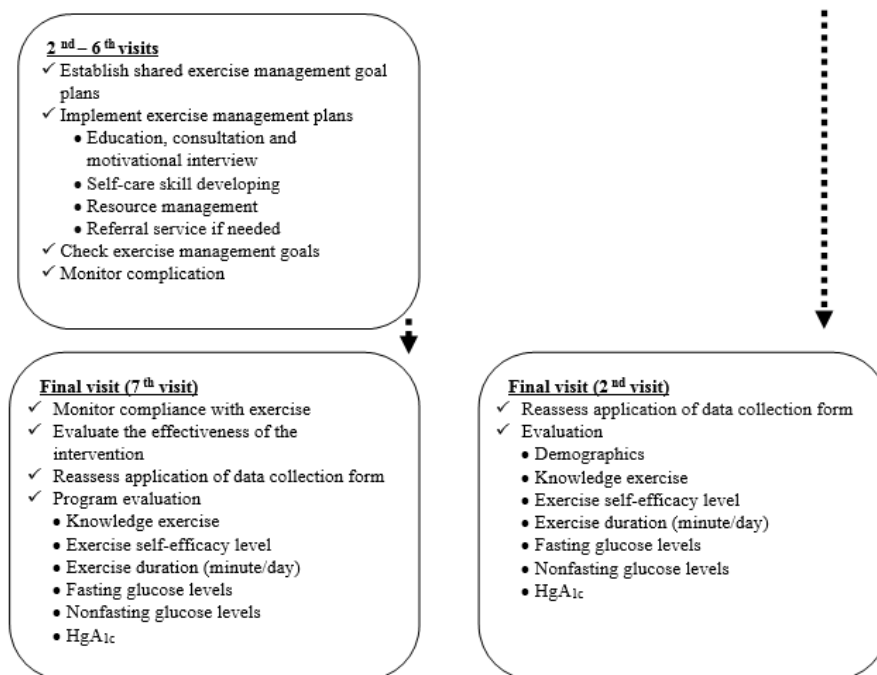

Figure 1 Structure and content of home visitation program on exercise behaviour of women with type 2 diabetes.

Author developed exercise habit gaining guide for the participants. Exercise guide will help you learn more about exercise. Guide will also provide when to exercise, the type of exercise and tips regarding how to exercise we recommend. In additional to, this guide was based on change in exercise behaviour and principles of motivational interviews [2,5-8]. This guide offered strategies to individuals experiencing different exercise behaviour.

Specific steps for home visitation program were beginning with first visit for the scheduling of visits and need definition regarding exercise management. Then, nurse conducted a visit tailored to the women's health condition during the home visits. These home visits provided exercise education and counselling. Visiting nurse collected intervention and control groups data on sociodemographic, and baseline levels on outcome measures: exercise knowledge, exercise self-efficacy level, exercise duration, fasting and non-fasting glucose levels, and HgA1c during their first visit. Visiting nurse was completed six month from baseline data collection and the termination of home visiting program.

Measurements

A personal description form. A personal description form was used to collect data about sociodemographic characteristics, health status, measurements (fasting glucose level, non-fasting glucose levels and HgA1c values), exercise duration (minute/day).

Exercise knowledge: The measurement of exercise knowledge was done to learn more positive and negative thoughts about the exercise to women with type 2 diabetes. Decision-making scale that measures exercise knowledge was developed by Marcus, et al. [9]. The test reliability was found to be 0.95 for its perceived benefits subscale and 0.79 for its perceived risks subscale [9]. It was adapted to Turkish culture by Gümüş and Kitiş [10] and its test reliability was found to be 0.90. The scale describes positive and negative aspects of behavioural change through two sub-dimensions.

•   Perceived benefits: It measures positive thoughts about exercise.

•   Perceived risks: It measures negative thoughts about exercise.

The scale is comprised of 16 questions and it is a five-point Likert scale. The lowest and the highest scores for perceived benefits are 10 and 50 respectively. The lowest and the highest scores for perceived risks are 6 and 30 respectively. High scores for perceived benefits and low scores for perceived risks show increased awareness of an individual about exercise [9].

Exercise self-efficacy scale: The scale was developed by Marcus, et al. [11] to determine the confidence level of individuals to start exercising. It is a 5-point Likert scale. The test reliability was reported to be 0.82 [11]. The scale was adapted to Turkish culture by Gümüş and Kitiş [10] and the test reliability was found to be 0.85. The lowest and the highest scores to be obtained are 5 and 25 respectively. High scores indicate that an individual is self-confident [11].

Statistical analysis

Estimation of sample size: Statistical power was calculated using the difference in change in exercise duration per week between groups (intervention and control group) obtained from a study. There was a 95% power of detecting 10% difference in exercise duration per week [12].

According to this study, with an expectation of a dropout rate of 5%, the sample size was increased to 64 (32 per group). In the fifth month of the study, one female in the intervention group dropped out the study due to pregnancy and 63 women completed the study.

Analysis: Data were analyzed using SPSS 21.0 program. The level of significance was set at $p<0.05$ for all analyses. The effect of the intervention was analyzed using paired t-tests within group and independent t-tests between groups. Percentage changes in biochemical values calculated by the formula: (pre-intervention/post-intervention) × 100.

RESULTS

A total of 63 (31 intervention group, 32 control group) female with type 2 diabetes completed home visiting program with measurement of intervention and control groups. The mean age of the intervention group was 39.12 ± 7.07 years. Women 45.4% were either primary or secondary school graduates and 32.9% were obese. Most of them were married and a housewife.

The mean age of the control group was 39.14 ± 1.75 years. Women 44.9% were either primary school or secondary school graduates and 21.7% were obese. Most of them were married and a housewife.

There was not a significant difference in age, education, marital status, income, employment status, smoking, regular use of antidiabetic drugs and receiving education about diabetes between the groups (p>0.05).

There was a significant difference in the mean scores of the intervention group for exercise knowledge, self-efficacy in exercise behaviour and exercise duration between the first and the last visits (p<0.05). The mean scores of the control group for exercise knowledge, exercise self-efficacy level and exercise duration across the first and the last visits were not significantly different (p>0.05). The intervention and the control groups significantly differed in terms of the mean scores for exercise knowledge, exercise self-efficacy level and exercise duration at the last visit (p<0.05) (Table 1).

Table 1 Changes in exercise knowledge and behaviour for the first and last visits

Groups	Intervention group			Control group			Last visit
	First visit	Last visit	Significance	First visit	Last visit	Significance	
Exercise self-efficacy	30.2 ± 11.5	41.4 ± 3.7	*p=0.00	28.6 ± 8.2	27.7 ± 9.5	*p=0.28	**p=0.00
Exercise duration (minute/day)	16.5 ± 22.0	40.4 ± 12.9	*p=0.00	17.8 ± 15.1	18.7 ± 24.9	*p=0.52	**p=0.00
Positive thoughts about exercise	15.4 ± 5.9	22.0 ± 2.8	*p=0.00	14.5 ± 5.5	14.8 ± 7.2	*p=0.17	**p=0.00
Negative thoughts about exercise	14.3 ± 6.2	7.5 ± 3.4	*p=0.00	13.9 ± 5.6	13.2 ± 5.9	*p=0.06	**p=0.00
*Paired t-test; ** Independent t-test							

There was a significant difference in the values of the intervention group for fasting glucose levels (p<0.00), non-fasting glucose levels (p<0.05), and HgA1c (p<0.01) between the first and the last visits. The values of the control group for fasting glucose levels, non-fasting glucose levels and HgA1c across the first and the last visits were not significantly different (p>0.05) (Table 2).

Table 2 Changes in biochemical values for the first and last visits

Biochemical values	Intervention group		Control group	
	First visit	Last visit	First visit	Last visit
Fasting glucose levels (mg/dl)	254 ± 65	154 ± 24*	241 ± 65	244 ± 15
Nonfasting glucose levels (mg/dl)	276 ± 74	223 ± 58**	251 ± 65	259 ± 98
HgA1c (%)	8.4 ± 2.4	6.2 ± 1.4***	8.7 ± 2.8	9.1 ± 2.7
*p<0.001, **p<0.05, ***p<0.01; compared with the values of the first visit				

At the intervention group detected decrease in fasting glucose levels, non-fasting glucose levels and HgA1c values (respectively 33%, 12%, 16%). At the control group was observed increase respectively 8%, 7%, 2%. At the intervention group significantly differed in terms of percentage changes in fasting glucose level, non-fasting glucose level and HgA1c values across the first and the last visits (p<0.05) (Figure 2).
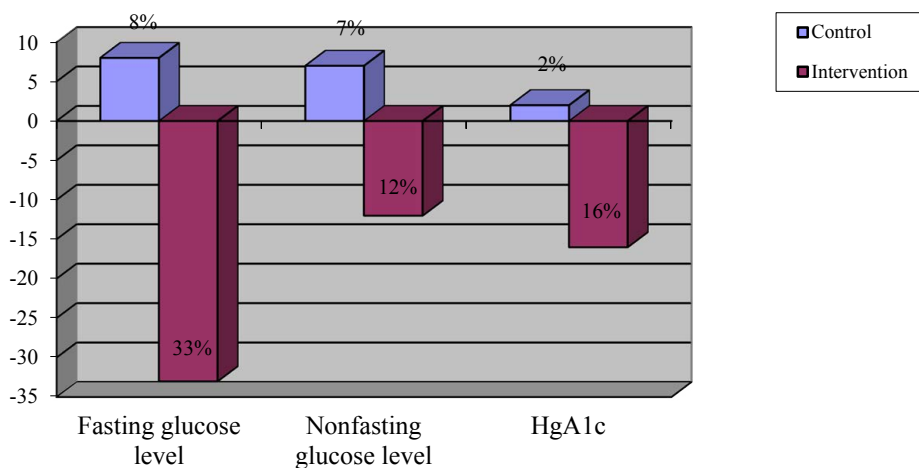

Figure 2 Percentage changes in biochemical values for the first and last visits.

DISCUSSION

Despite the community health centre's efforts to improve exercise management, poor exercise management remains a significant problem, particularly among type 2 diabetes adults [2,5,13]. Home visiting intervention for exercise management proved its effectiveness in promoting women's ability to exercise management among women with type 2 diabetes.

Our home visiting intervention, which was coordinated with support from visiting nurse, improved exercise self-efficacy level, exercise duration (minute/day) and exercise knowledge among women with type 2 diabetes.

Exercise self-efficacy is defined as self-confidence for maintenance of behaviour in the presence of difficulty. We found that self-efficacy in exercise management could be enhanced through a personalized education, consultancy, and motivational interview.

An important data of this study was increased exercise duration (minute/day) in last visit for the intervention group. Kirk, et al. [14] gave counselling for exercise, motivation theory and cognitive behaviour strategies to increase exercise in type 2 diabetes patients and detected a significant difference in exercise duration between groups. Other relevant studies have revealed an increase in exercise duration in individuals offered education [15]. Consistent with the literature [15-18] the present study showed an increase in the exercise duration in the intervention group. This suggested that the intervention group continue to do exercise regularly.

Adequate knowledge about exercise is crucial in management of type 2 diabetes, along with nutrition and medical treatment [19]. Adults with type 2 diabetes who have a good understanding the importance of exercise in their condition are more likely to be responsible for their disease management and control of HgA1c [20].

Fasting glucose level, non-fasting glucose level and HgA1c values in exercise management improved through visits. One of important strategies for type 2 diabetes is fasting glucose level and non-fasting glucose level and HgA1c values monitoring [21]. Such a strategy helps with increased awareness of diabetes and improves exercise management. In the intervention group demonstrated improvements in glycaemic control between the first and the last visits. In the intervention group recorded a mean decrease in HgA1c of 0.16% and the control group recorded a mean increase of 0.2%. Tight glycaemic control has been shown to reduce the risk of death and the development of diabetic complications [22].

To conclude, starting exercise can be a turning point for some people and a new starting point for others. What is important is that they should be aware of damage due to inactivity and implement strategies which allow them to start exercise. It is acknowledged that implementing these strategies can be difficult. Nursing interventions performed to support individuals should involve informing and counselling. This home visitation program is helpful in exercise behaviour improving among women with type 2 diabetes. Follow-ups and support should be continued to maintain success in people at risk like diabetes.

REFERENCES

[1] Al-assan, Mousa A., Nemeh A. Al-Akour, and Motaz Mohammad Aburas. "Relationship between motivational style and glycemic control in Jordanian patients with type 2 diabetes mellitus." *Journal of diabetes* 9.1 (2017): 93-101.

[2] American Diabetes Association. "The prevention or delay of type 2 diabetes." *Diabetes care* 25.4 (2002): 742-749.

[3] Scheen, A. J. "Aggressive weight reduction treatment in the management of type 2 diabetes." *Diabetes* 110897.107387b (2017).

[4] Kitis, Yeter, et al. "Frequency and affecting factors of metabolic syndrome in women older than 20 years age of the metabolic syndrome in women aged 20 or older and the factors that affect it"'. *The Anatolian Journal of Cardiology (Anadolu Kardiyoloji Dergisi)* 10.2 (2010): 111-120.

[5] Kueh, Yee Cheng, Tony Morris, and Aziz-Al-Safi Ismail. "The effect of diabetes knowledge and attitudes on self-management and quality of life among people with type 2 diabetes." *Psychology, health & medicine* 22.2 (2017): 138-144.

[6] Yardley, Jane E., and Sheri R. Colberg. "Update on management of type 1 diabetes and type 2 diabetes in athletes." *Current Sports Medicine Reports* 16.1 (2017): 38-44.

[7]   Hardcastle, Sarah J., et al. "Effectiveness of a motivational interviewing intervention on weight loss, physical activity and cardiovascular disease risk factors: a randomised controlled trial with a 12-month post-intervention follow-up." *International journal of behavioral nutrition and physical activity* 10.1 (2013): 40.

[8]   Tosun, Alime Selçuk, and Handan Zincir. "Motivational interview method based on trans theoretical model of health behaviour change in type 2 diabetes mellitus." *Psikiyatride Guncel Yaklasimlar-Current Approaches in Psychiatry* 8.1 (2016): 32-41.

[9]   Marcus, Bess H., William Rakowski, and Joseph S. Rossi. "Assessing motivational readiness and decision making for exercise." *Health Psychology* 11.4 (1992): 257.

[10] Gümüş, Y., and Kitiş, Y. "The validity and reliability of change scales in exercise behavior." *Journal of Hacettepe University Faculty of Nursing* 2.3 (2015): 1-19.

[11] Marcus, Bess H., et al. "Self-efficacy and the stages of exercise behavior change." *Research quarterly for exercise and sport* 63.1 (1992): 60-66.

[12] Kirk, A. F., et al. "A randomized, controlled trial to study the effect of exercise consultation on the promotion of physical activity in people with type 2 diabetes: A pilot study." *Diabetic Medicine* 18.11 (2001): 877-882.

[13] Zone, C. P. D., and Suppliers Guide. "Examining the risk factors of type 2 diabetes." *Nursing in Practice* 3531.934 (2017).

[14] Kirk, Alison, et al. "Increasing physical activity in people with type 2 diabetes." *Diabetes Care* 26.4 (2003): 1186-1192.

[15] Chen, Shu Ming, et al. "Effects of motivational interviewing intervention on self-management, psychological and glycaemic outcomes in type 2 diabetes: A randomized controlled trial." *International journal of nursing studies* 49.6 (2012): 637-644.

[16] Heydari, Heshmatolah, et al. "Predictive power of the trans-theoretical model of physical activity in patients with type-2 diabetes." *Bull. Env. Pharmacol. Life Sci* 3.3 (2014): 141-151.

[17] Kushnir, Vladyslav, et al. "Motivation to quit or reduce gambling: Associations between self-determination theory and the trans theoretical model of change." *Journal of addictive diseases* 35.1 (2016): 58-65.

[18] Van Nes, Michelle, and Jo-Ann V. Sawatzky. "Improving cardiovascular health with motivational interviewing: A nurse practitioner perspective." *Journal of the American Academy of Nurse Practitioners* 22.12 (2010): 654-660.

[19] Yin, Junmei, et al. "Gender, diabetes education, and psychosocial factors are associated with persistent poor glycaemic control in patients with type 2 diabetes in the Joint Asia Diabetes Evaluation (JADE) program." *Journal of diabetes* 8.1 (2016): 109-119.

[20] Norris, Susan L., et al. "Long-term non-pharmacological weight loss interventions for adults with type 2 diabetes mellitus." *Sao Paulo Medical Journal* 134.2 (2016): 184-184.

[21] Kelley, G. A., and Kelley, G. S. "Effects of aerobic exercise on lipids and lipoproteins in adults with type 2 diabetes: a meta-analysis of randomized-controlled trials." *Public health* 121.9 (2007): 643-655.

[22] Mason, Ashley E., et al. "Effects of a mindfulness-based intervention on mindful eating, sweets consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial." *Journal of behavioral medicine* 39.2 (2016): 201-213.