

Outcomes of a type 2 diabetes education program adapted to the cultural contexts of Saudi women. *A pilot study*

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ABSTRACT

Objective: To explore the outcomes of a pilot intervention of a type 2 diabetes (T2D) education program, based on international standards, and adapted to the cultural and religious contexts of Saudi women.

Methods: This study is an experiment of a pilot intervention carried out between August 2011 and January 2012 at the primary health clinics in Dammam. Women at risk of or diagnosed with T2D (N=35 including dropouts) were assigned to one of 2 groups; an intervention group participated in a pilot intervention of T2D education program, based on international standards and tailored to their cultural and religious contexts; and a usual care group received the usual care for diabetes in Saudi Arabia. Outcomes included blood glucose, body composition, 6-minute walk distance, life satisfaction, quality of life, and diabetes knowledge. The intervention group participated in a focus group of their program experience. Data analysis was based on mixed methods.

Results: Based on 95% confidence interval comparisons, improvements were noted in blood sugar, 6-minute walk distance, quality of life, and diabetes knowledge in participants of the intervention group. They also reported improvements in lifestyle-related health behaviors after the education program.

Conclusion: Saudi women may benefit from a T2D education program based on international standards and adapted to their cultural and religious contexts.

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Saudi women have a higher prevalence of obesity than men, which increases their risk of type 2 diabetes (T2D).¹ The reporting of diabetes is higher in women compared to men in all provinces of Saudi Arabia.¹ Diabetes education programs in Saudi Arabia do not target people at risk of diabetes with emphasis

on diabetes prevention and feasible changes to lifestyle behaviors.² Scientific evidence suggests that diabetes education programs based on international standards of lifestyle behaviors, are more effective when tailored to the cultures and religions of targeted groups.³⁻⁶ The aim of this study was to explore the outcomes of a pilot intervention of a T2D education program based on international standards and adapted to the cultural and religious contexts of Saudi women. Specifically, whether such a program can impact health outcomes (for example, physical health measures, diabetes knowledge, life satisfaction, and health-related quality of life, diabetes knowledge) in comparison with the usual care of T2D in Saudi Arabia.

Methods. Ethical approval was obtained from the ethical review boards of the participating university and medical research administration board (The University of British Columbia, Vancouver, Canada, and the Saudi Administration for Medical Research, Riyadh, Saudi Arabia). Ethical approval standards are consistent with the requirements of the Helsinki Declaration. The study was an experiment of a pilot intervention of a 6-week T2D education program carried out between August 2011 and January 2012. Potential participants were recruited from the 3 largest primary health clinics in Dammam. Inclusion criteria were women 17 to 70 years of age, at risk of or diagnosed with T2D. Women who were pregnant were excluded. The number of study participants was 35 with initial dropouts of 16 prior to the start of the program. The 6-week education program was launched in a primary health clinic close to where most participants lived. Assigning participants to a group was based on their location and willingness and ability to attend the sessions of the 6-week education program. Participants were assigned to one of 2 groups. The intervention group participated in a T2D education program based on international standards and adapted to the cultural and religious contexts of women in Saudi Arabia. The usual care group received the usual care for T2D only. For all participants, objective measures included random blood sugar based on a finger-prick procedure (mg/dl), waist-to-hip ratio (WHR), weight (kg), height (cm), and body mass index (BMI) (weight

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[kg]/height [m²]). These measurements were repeated at baseline and after the 6-week intervention period. The life satisfaction (LISAT) questionnaire, health-related quality of life questionnaire (SF12), diabetes knowledge test (DKT), and a program satisfaction questionnaire were completed by participants in both groups at baseline and after 6 weeks. Because sex life is bounded by marital relationship and considered a private matter in Muslim cultures, questions regarding satisfaction with sex life were deleted. Items 5, 15, and 17 in the DKT, developed by the Michigan Diabetes Research Training Center (MDRTC), were designed to test the knowledge of health professionals, thus were removed from the version we used in this study. Body composition measures were conducted with standard objective tools and procedures. A standard clinical weight scale with a height feature was used to record weight and height from which BMI was calculated. Waist and hip girths were measured in a standardized manner with a semi-flexible measuring tape. The 6-minute walk (6MWT) was to test participants' functional walking endurance capacity. After 6 weeks, women in the intervention group were advised on continuing to practice what they had learned in the education program. They reported their experiences in the education program in an audio-recorded focus group discussion. Participants of both groups were awarded one of 2 certificates. A standard certificate was awarded to the usual care group, and an advanced certificate was awarded to the intervention group. For the education program in the intervention group, established evidence-based reports from the Harvard Health Publications related to T2D lifestyle behaviors were selected, particularly weight reduction and physical activity, healthy eating for T2D, and positive psychology.⁷ The Harvard Health Publications related to T2D are oriented primarily to western cultures. To tailor the content of these publications to the cultural and religious contexts of study participants, the primary investigator selected religion-based quotes, and behaviors, and beliefs from the Saudi culture that matched topics from the Harvard Health Publications. A description of the 6-week education program is detailed elsewhere.⁸

The IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp, Armonk, NY, USA) was used to analyze demographic data, body composition data, exercise data, and questionnaire responses of the DKT, program satisfaction, and the LISAT, before and after the 6-week period (education program) in both groups. The LISAT scores were computed (mean of 8-item scores). The SF12 scoring license was obtained to score

the data. The statistical software was used to compare the scores of the SF12 of the 2 groups before and after the education program. For the DKT data, percentage of correct answers to the questions was computed. Data for the outcome variables were organized to provide descriptive statistics of participants' socio-demographic characteristics, ages, health profiles, and stress and sleep behaviors. Descriptive statistics and frequency of occurrence for participants in both groups before (pre) and after (post) the education program were provided for the following variables: physical measurements including weight, BMI, WHR, blood sugar, and 6MWT distance, and scoring results of the DKT, LISAT, and SF12. To examine tendencies in the variables after the 6-week period in both groups, differences (post-pre intervention) for the physical measurements, DKT, LISAT, and SF12 were calculated. To minimize type 1 error due to the small sample size, we used 95% confidence intervals (CIs) to examine the pre/post differences of the sample means of physical measurements, and the scores of the DKT, LISAT, and SF12 between the 2 groups. Significance of the difference in the 2 groups is determined by whether zero is in between the upper bound and lower bound of the CIs or not, such as, if there is no zero, the difference in the 2 groups is significant. Atlas.ti[®] software (Scientific Software Development GmbH, Berlin, Germany) was used to organize and code the qualitative data from the focus group discussion with the intervention group in line with the thematic analysis approach.⁹

Results. The total number of participants who completed the study were 8 in the intervention group, and 6 in the usual care group. Total number of recruited participants in the study was 35 (16 in the intervention group and 19 in the usual care group). Initial dropouts before the education program were 3 in the intervention group and 13 in the usual care group. During the education program, 5 dropped out from the intervention group. Dropouts were related to transportation issues, conflicting schedules, and family demands. Demographic characteristics of participants in both groups appear in Table 1. Based on CI comparisons, our data show tendencies toward improvement in physical measurements for participants in the intervention group compared with the usual care group after the 6-week education program (Table 2). The distance walked in the 6MWT tended to increase in both groups. The 95% CI of pre/post difference for the 6MWT distance was significant in the intervention group but not significant in the usual care group. Measures of pre/post differences of blood

Table 1 - Participant characteristics for both groups of women at risk or diagnosed with type 2 diabetes mellitus.

Variable	Intervention group n (%)	Usual care group n (%)
<i>Marital status</i>		
Married	5 (38.5)	6 (100.0)
Single	1 (7.7)	---
Divorced	2 (15.4)	---
Separated	1 (7.7)	---
Widowed	4 (30.8)	---
<i>Number of children</i>		
0-2	3 (27.3)	1 (16.7)
3-10	8 (72.7)	5 (83.3)
<i>Educational status</i>		
No formal education	1 (7.7)	---
Primary	1 (7.7)	---
Intermediate	5 (38.5)	---
Secondary	4 (30.8)	1 (16.7)
Diploma	1 (7.7)	3 (50.0)
University	1 (7.7)	2 (33.3)
Graduate	---	---
<i>Occupational status</i>		
Homemaker	3 (27.3)	---
Employed	9 (69.2)	6 (100.0)
Student	1 (7.7)	---
Retired	---	---
<i>Source of income</i>		
Personal	7 (53.8)	---
Husband or guardian	3 (27.3)	---
Both	2 (15.4)	6 (100.0)
Other	1 (7.7)	---
<i>Income (Saudi Riyals)</i>		
<3,000	2 (15.4)	---
≥3,000 to <5,000	4 (30.8)	---
≥5,000 to ≤10,000	5 (38.5)	1 (16.7)
>10,000	2 (15.4)	5 (83.3)

sugar levels reveal a minor decrease in the intervention group and a minor increase in the usual care group with no significance in the intervention group or the usual care group. The 95% CI of pre/post differences of DKT scores in the intervention group and the usual care group show that pre/post differences of DKT were significant in both groups (Table 3). The WHRs show a minor decrease for participants in the intervention group and a minor increase of WHR in the usual care

Table 2 - Physical measures, pre/post-program difference by group among women at risk or diagnosed with type 2 diabetes mellitus.

Group	n	Mean	SE	95% CI
<i>Body mass index</i>				
Intervention	9	0.1	0.5	(-1.10, 1.39)
Usual care	5	-0.3	0.6	(-2.00, 1.36)
<i>Weight</i>				
Intervention	9	0.5	1.3	(-2.58, 3.58)
Usual care	5	-0.7	1.4	(-4.67, 3.27)
<i>Waist circumference</i>				
Intervention	9	-6.9	5.8	(-20.35, 6.57)
Usual care	4	2.5	1.1	(-0.88, 5.88)
<i>Hip circumference</i>				
Intervention	9	-0.9	0.4	(-1.76, -0.01)
Usual care	4	-1.0	0.5	(-2.51, 0.46)
<i>Waist-to-hip ratio</i>				
Intervention	9	-0.1	0.1	(-0.42, 0.17)
Usual care	4	0.1	0.0	(-0.03, 0.17)
<i>Blood sugar</i>				
Intervention	4	-42.8	49.0	(-198.61, 113.11)
Usual care	3	9.0	14.6	(-53.70, 71.70)
<i>Six-minute walk test distance</i>				
Intervention	8	18.2	5.6	(4.87, 31.56)
Usual care	2	18.9	27.6	(-332.13, 369.88)

SE - standard error, CI - confidence interval

group after the 6-week education program (Table 2). The health-related quality of life (SF12) scores showed a minor increase in the intervention group and a minor decrease in the usual care group but not significance in both of the physical and mental components (Table 3). The LISAT scores tended to decrease in both groups after the 6-week period (Table 3). Themes that emerged from the focus group discussion with participants in the intervention group showed that they had benefited from the education program. They reported increasing their physical activity and had improved their nutritional behaviors and choices. One participant said that she and her children walked and danced together. Another participants mentioned that she had never liked eating fruits and vegetables until the education program. Participants mentioned that they liked the education session on happiness and wellbeing. Two participants said that they practiced the relaxation exercises they learned from the education program regularly. Another participant reported passing on the knowledge she

Table 3 - The LISAT and DKT, pre-program, post-program, and pre/post-program difference by group, and SF12, physical component, mental component, and total by combined groups women at risk or diagnosed with type 2 diabetes mellitus.

Group	n	Mean	SE	95% CI
<i>LISAT total pre-program</i>				
Intervention	11	2.2	0.2	(1.83, 2.58)
Usual care	5	2.8	0.4	(1.57, 4.03)
<i>LISAT total post-program</i>				
Intervention	10	2.2	0.1	(2.04, 2.31)
Usual care	4	2.3	0.1	(1.87, 2.63)
<i>LISAT pre/post-program difference</i>				
Intervention	8	-0.1	0.1	(-0.43, 0.21)
Usual care	3	-0.6	0.6	(-3.29, 2.09)
<i>DKT pre-program</i>				
Intervention	11	10.5	0.8	(8.72, 12.84)
Usual care	5	10.2	0.6	(8.45, 12.55)
<i>DKT post-program</i>				
Intervention	10	14.3	1.0	(11.70, 16.52)
Usual care	5	12.8	0.7	(10.03, 15.47)
<i>DKT pre/post-program difference</i>				
Intervention	9	3.3	1.0	(0.96, 5.70)
Usual care	4	2.3	0.3	(1.45, 3.05)
<i>SF12 physical component</i>				
Combined groups	12	4.06	4.32	(-5.57, 13.68)
<i>SF12 mental component</i>				
Combined groups	12	4.01	5.76	(-8.83, 16.85)
<i>SF12 total</i>				
Combined groups	12	80.29	38.61	(-5.73, 166.31)

SE - standard error, CI - confidence interval, LISAT - life satisfaction, DKT - diabetes knowledge test, SF12 - health-related quality of life

learned from the education program to her diabetic mother and social network.

Discussion. Several trends emerged in the variables of interest measured before and after the 6-week T2D education program. Compared with the usual care group, the intervention group showed tendencies toward improvement in health-related quality of life, 6MWT distance, blood sugar levels, and DKT scores. These improvements correspond with literature reporting the outcomes of a diabetes education program. For instance, there is evidence of improvement in participants' quality of life in response to diabetes education, at least in the short-term.^{6,10} There is a scarcity of data on Saudi women's life satisfaction, quality of life, or the 6MWT

distance in healthy adults in Saudi Arabia. Moreover, no BMI guidelines officially exist for Saudis. According to the range of International Classification of adult underweight, overweight, and obesity (18.5 to 24.9 kg/m²), BMIs for all study participants in both groups (above 30 kg/m²) were above the healthy weight.¹¹ The mean WHR for participants in both groups was above 0.8, indicating that both groups are at increased health risk.¹² Diabetic participants in the intervention group reported that they became more disciplined in monitoring their blood sugar and self-administering insulin. These behavioral changes could have reflected the decrease in blood sugar levels among study participants in the intervention group, consistent with other studies.^{6,10}

Findings from a community-based diabetes education program confirmed improvement in diabetes knowledge and self-reported lifestyle-related behaviors.^{6,10} Recent studies show that people in Saudi Arabia have poor knowledge of diabetes.¹³⁻¹⁴ The literature suggests that ongoing social support is a key factor for sustaining healthy lifestyle behaviors of participants in diabetes education programs.⁶ Our study participants acknowledged the role of ongoing encouragement and motivation to sustain their positive lifestyle behaviors. Participants interested in transmitting diabetes education into their communities through their families, and friends is consistent with the World Health Organization initiative of peer support programs related to diabetes.¹⁵ The impact of the role of study participants in promoting healthy lifestyle behaviors in their communities warrants further investigation.

Study limitations include the small sample size of study participants and short-term outcomes. Also, recruiting Saudi women warrants particular consideration if random assignment to groups is to be achieved. This study serves as a framework for replication and extension studies related to T2D education programs not only for women, but also men in Saudi Arabia and people in neighboring Arab countries.

In conclusion, this study sheds light on the experiences of Saudi women and supports their positive responses to a 6-week T2D education program, based on international standards and adapted to their cultural and religious contexts. Targeting lifestyle-related health behaviors of women can have positive impact on their families. Our preliminary findings have provided a baseline description of Saudi women's life satisfaction and health-related quality of life, given that no previous data are available, and serve as a basis for future research.

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