

Effect of Ramadan Instructional Program on Glycemic Control among Elderly People with Diabetes

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Abstract: Fasting in Ramadan month for elderly with diabetes is a challenge, but numerous elderly with diabetes select to fast despite the guidance for not to do by health professionals. **Purpose:** Assessment of the effect of Ramadan instructional program on glycemic control among elderly patients with diabetes. **Design:** A Quasi-experimental design was used. **Setting:** This study was conducted at five geriatric home in Cairo City (Hadaya Barakat, Al-Safa, Al-Marwa, Om- Hani and Al-Fayoum geriatric home). **Sample:** A Purposive sample of two hundred elderly patients with diabetes were divided into two groups (100 elderly patients with diabetes in each group), the first group was educated for Ramadan instructional program (intervention group), and the second group was not educated Ramadan instructional program (control group). **Tools:** 1- structured interviewing questionnaire concerned with (socio-demographic data and personal medical history). 2- Glucometers sheet. 3- adherence to a healthy diet sheet. 4- biochemical clinical and metabolic parameters charts. 5- Physical Activity Scale for the Elderly (PASE). **Results:** Elderly patients who developed hypoglycemia in the intervention group were less than control group (17.0% Vs 34.0%). Also, patients who developed hyperglycemia in the intervention group were less than control group (26.0% Vs 48.0%). **Conclusion:** Elderly patients who received Ramadan instructional program (intervention group) had more glycemic control than elderly patients who did not (control group). **Recommendation:** Specialized instructional program for glycemic control should be planned for elderly patients with diabetes before Ramadan.

Keywords: Ramadan instructional program, glycemia control, elderly people with diabetes.

1. INTRODUCTION

The WHO describes the elderly as people above 60 or 65 years, though greatest scientific societies recognize them as equal to or more than 75. Really, it is extra necessary to recognize the physiological or vascular age that changes according to hereditary and environmental circumstances, and the presence or absence of morbidities before-mentioned as diabetes mellitus, hypertension, obesity, and cognitive dysfunction (Kirkman et al., 2012).

Diabetes mellitus remains one of the common frequent diseases in elderly people. It is a common health problem global (Gaborit et al., 2011). Its rate changes according to hereditary, age-related, and environmental circumstances. In people aged 60 and above, the insulin excretion may further be diminished. Consequently, the currency of diabetes mellitus in the elderly age group ranges from 18% to 33% (Niazi & Kalra, 2012).

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population. This reflects an increase in associated risk factors such as being overweight or obese. Over the past decade, diabetes prevalence has risen faster in low- and middle-income countries than in high-income countries (WHO, 2016). Diabetes mellitus is a major health problem in all age populations, with complications that adversely affect the autonomy

and quality of life of peoples with a heavy demand on health care resources. Inactive lifestyle, urbanization, eating habits and increasing obesity have been identified as independent risk factors for diabetes (Al-Arouj, Assaad-Khalil & Buse, 2010).

Ramadan fasting immediately affects the control of diabetes because of this month is characterized by long variations in feeding times, kinds of meals, handling of medication and irregular lifestyle. A fasting person typically gets a couple of meals: a big, high caloric meal following evening (Iftar) and a little, low-calorie meal only before daybreak (Sahor) (Prataksitorn & Singchungchai, 2014). Little meals may be used within these two chief meals. Meals are customarily extraordinary in carbohydrates and fat content. Several elderly people fast without medical supervision. this may induce complications such as hypoglycemia and hyperglycemia (Shete, Shaikh & Nayeem, 2013).

The control of diabetes through Ramadan fasting should be recognized well in throughout the holy month. Diabetes care units should develop comprehensive plans several months before Ramadan (Inzucchi, Bergenstal & Buse, 2012). Elderly people should be helped to modify their own ideas and practices to improve diabetes control strategies. Elderly peoples should be encouraged to ask advice before fasting the month of Ramadan and visit diabetic clinics. Counseling before Ramadan is necessary for diabetic patients they like to fast through Ramadan, although they should modify their medication timing, medication doses, perform dietary adjustments and make physical activity. Self-monitoring of blood glucose levels is particularly necessary to identify serious symptoms (Karoli et al., 2011). Most diabetics do not prefer pre- Ramadan counseling, they think it is not important. Every diabetic patient who wants to fast through Ramadan should get specific health advice 1–2 months before the start of Ramadan (Hassanein, 2015).

Health education is very important before starting of Ramadan and should be delivered to the common people, health-care specialists, and people with diabetes. People performing the structured instructional program for Ramadan should emphasize on four important sectors: (1) nutrition plan and dietary guidance, (2) exercise, (3) blood glucose monitoring, and (4) identification and control of complications (Tourkmani et al., 2016).

The significance of the study:

Diabetes mellitus is a significant health obstacle that affects among age groups, and cause complications that negatively affect the quality of life of peoples and their related items, including a heavy demand on health care resources. The rate of diabetes mellitus in Egypt is increasing. In 2014, above 7.5 million people (aged 20–79 years) are diagnosed with diabetes mellitus in Egypt. Also, this number is supposed to increase to 13.1 million at the year 2035 (Khattab et al., 2016). However, more than 80 million people in Egypt are Muslims. The majority of them decide to fast through Ramadan (International Diabetes Federation Middle East and North Africa; 2015). During Ramadan, the fasting hours may extend to more than 12 hours, furthermore. The eating habits during this month may increase the levels of carbohydrate and fatty meals. The long fasting hours as well as the eating habits may increase the risk of diabetic complications in the elderly group. (Karatoprak et al., 2013). There has been an increased awareness to control diabetes during Ramadan by introducing an educational program focusing on the glycemic control in elderly patients. Therefore, this study was done for the purpose of dietary adjustment and self-monitoring of blood glucose levels. (Al-Qazaz et al., 2012).

The purpose of the study:

Assess the effect of Ramadan instructional Program on Glycemia Control among Elderly People with Diabetes

Research Hypothesis:

Elderly people with diabetes who receive Ramadan instructional program (study group) will have more glycemia control than elderly people who will not receive it (control group).

2. SUBJECT AND METHODS

Research Design:

A quasi-experimental design (intervention and control) was used in this study to examine the effect of Ramadan instructional Program on glycemic control among Elderly People with Diabetes.

Study Setting:

The study was conducted at a Five Geriatric Homes in Cairo City (60 cases were selected from Hedaya Barakat other 80 elderly patients with diabetes were selected from Al-Safa, and Al-Marwa. There were other 40 cases were selected from Om-Hani. Furthermore 20 cases were selected from Al-Fayoum geriatric home.

Sample:

The sample of this study was a **purposive sample** of two hundred of elderly people with diabetes were selected. This number of elderly people with diabetes was divided into two groups. The first group was used Ramadan instructional program, and the second group did not used Ramadan instructional program, (100 elderly people with diabetes in each group).

Inclusion criteria:

- Age 60 years and more
- Have type 1 and type 2 diabetes

Exclusive criteria:

- Associated chronic illness because it could reduce the tolerance for fasting

Tools of data collection:

1- Structured interview questionnaire was used to collect data, which include the following parts:

- **Part I: Socio-Demographic Data:** It included personal data such as age, gender, and education level.
- **Part II: Medical History:** It included data about the medical history such as duration of diabetes (years), type of diabetic therapy used, Pre-Ramadan doctor Visit, during Ramadan doctor visit, drug dosage and timings during Ramadan and pre-Ramadan hemoglobin A1c (HbA1c) level.

2- Glucometers sheet: it was used to asses blood glucose readings 5 times/day (**Said et al., 2015**): before pre-dawn meal (Suhoor); 2 hours post Suhoor; between 12 pm to 2 pm; before breaking fasting (Iftar); and 2 hours post-Iftar to guide diabetes management. Hypoglycemia was assessed via review of symptoms and these readings.

3- Adherence to a healthy diet sheet: It was used to assess dietary adherence. It was developed by **Permatasari (2014)** and adopted by the researchers. It was used to calculate nutritional composition and glycemic load per 100 g of food and beverage items.

4- Biochemical Clinical and Metabolic Parameters Charts: It was developed by (**Patel et al., 2015**). It contained body mass index (BMI), systolic and diastolic blood pressure, lipid profile, HbA1c, and hypoglycemia questionnaire

5- Part VI: Physical Activity Scale for the Elderly (PASE): it was adopted from (**Samantha et al., 2013**) for the purpose of evaluating the components of physical activities involving leisure time, work-related activities, and the household. The PASE examines the intensity, frequency, and duration of physical activities related to walking; light, moderate, and strenuous sports and entertainment activities; muscle strengthening and endurance exercises; work-related activities including walking and standing up; lawn and garden care; care for another individual; house repairs; and heavy and light household activities performed by the participants within the last week. The PASE is a self-reported questionnaire that consists of 12 questions regarding the frequency and duration of leisure time activity, household activity, and work-related activity during the previous 7-day period.

Scoring system:

The questions are scored differently. Participation in leisure time and strengthening activities are scored as never, seldom (1 or 2 days per week), sometimes (3 or 4 days per week), and often (5–7 days per week). Duration of these activities is scored as less than 1 h, 1–2 h, 2–4 h, and more than 4 h. Household and work-related activities are scored as yes or no. In work-related activities, work is scored in hours per week. The total PASE score is computed by multiplying either the time spent in each activity (hours per week) or participation (i.e. yes or no) in an activity by empirically derived item weights and then summing the overall activities. The overall PASE score ranges from 0 to 793 with high scores show better physical activity levels.

Methods:
Procedure for Data Collection:

An official letter was sent from the dean of the faculty of Nursing, Fayoum University to the directors of the related places explaining the purpose and methods of data collection.

1- Study period: The study was conducted from April 2015 till July 2015.

2- Reliability of the developed instruments: was done by alpha Cronbach test. Reliability was applied by the researcher for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar conditions on one or more occasions, Answers from repeated testing were compared (Reliability for tool 1 was 0.76, tool 2 and 4 were = 0.77% and for tool 3 & tool 5 were = 0.85 Cronbach's Alpha reliability).

3- Validity of the tools: the tools tested by five professors in community health nursing and some modifications were done according to professor's opinion. The content and face validity of the study tools were measured to evaluate the individual items as well as the entire tools for relevancy and appropriateness.

4- Pilot study was carried out on 10 elderly diabetic peoples in April 2015. They were excluded from the study sample. It was done to test the clarity of data collection tools to detect any obstacles or problem that might arise in data collections and estimate the time needed to fill the tools.

5- Ethical considerations:

A written consent was taken from elderly people with diabetes before including in the study. A clear and easy information was provided according to their level of knowledge, physical and mental willingness about the purpose of the study and methods of data collection. They were assured that data was going to be utilized for research purposed only exclusively. The elderly people with diabetes were notified that cooperation in the study was voluntarily and they had the freedom to withdraw from the study at any stage without providing any rationale.

The Study Intervention:

The study intervention consisted of Ramadan instructional program for elderly patients with diabetes. This was developed by the researcher to help the elderly in keeping glycemic control during fasting Ramadan. This was to be achieved through teaching the elders about healthy diet, exercise in order and frequent blood glucose monitoring to controlling their blood glucose levels.

The instructional program was designed based of reviewing past and current related literature **Permatasari (2014) and Samantha et al., 2013** and implemented by the researchers in the light of the patients' needs. As, identified in the pre-intervention assessment phase. It was planned to cover the gaps of knowledge and practice for elderly patients aiming to controlling their blood glucose levels. The content of program covered the following areas: diabetes definition, causes, types, complications, proper diet, exercise, healthy diet, symptoms of hyperglycemia or hypoglycemia, self-monitoring of blood glucose level, blood pressure and body weight and the importance to visiting diabetic clinic for counseling pre-Ramadan These were organized in 8 sessions as follows.

Interviewing phase:

In this phase, the researcher met the elderly people for the first time in the geriatric home clinic, where they came for follow up. All elderly people in both groups were interviewed to collect data related to socio-demographic data characteristic such as gender, age, education, weight, and height. Then, data about medical personal history such as the type of diabetes, duration and type of therapy for diabetes was obtained from patients record in geriatric homes. The researcher was facing the elderly people while asking them questions in Arabic and reordering their answers in the tool. Each interview lasted for about 15 minutes for each elderly patient.

Assessment phase:

This phase was started one month before Ramadan. in this phase, the researcher started the physical examination for elderly people. That included assessment of blood pressure, height, weight and recording pre-Ramadan weight (as a

baseline measure) through subtracting Ramadan weight gain from pre-Ramadan weight and calculating the body mass index (BMI) through dividing the new weight in Kg, by height in meters squared (wt. / ht² m). Each assessment lasted for about 20 minutes for each elderly people in both groups. These data were recorded in the assessment sheet.

An assessment for the diet of elderly people was conducted one week before Ramadan, every week in Ramadan and three four weeks after termination of Ramadan. for the intervention and control group. Weight and height were obtained by researchers and recorded one week before Ramadan, every week during Ramadan and four weeks after termination of Ramadan. Weight and glycemc complications were routinely documented in the assessment sheet. Blood specimens were obtained for fasting blood sugar, serum lipids. A blood specimen for HbA1c analysis was obtained before Ramadan and the middle of Ramadan then one month after termination of Ramadan. Also, manifestation of hypoglycemia and other complication were recorded for the intervention and control group.

Implementation phase (intervention group):

The intervention group was divided into 10 groups. Each group contain 10 elderly patients with diabetes. The program had 8 sessions for 8 days for each group and each sessions lasted for 2 hours as the following:

Sessions 1: This session was about acquaintance, identifying the program objectives content, and procedures. The objective of this session was to acquaint and inform the participants about the program aim and procedure.

Sessions 2 and 3: these sessions were about overview of the diabetes mellitus, the goal of these sessions is to make patients with diabetes aware of diabetes mellitus definition, types, complications, management, treatment, medications and demonstration and re-demonstration of self-monitoring of blood glucose level using electronic blood glucose monitor.

Sessions 4 and 5: these sessions were about recommended healthy nutrition. The goal of these sessions is to make patients with diabetes recognize the benefits of nutrition intervention and modification of their dietary life style. also, information about healthy diet and distribution of calories during iftar, sohor and in between.

Session 6: This session was about visiting diabetic clinic for counseling pre-Ramadan. The goal of this session is to helping patients with diabetes determine that pre-Ramadan doctor visit is necessary for every patient like to fast through Ramadan. They should modify medication timing, doses, and perform dietary adjustments.

Sessions 7: explain the importance of exercises and daily living activities, the goal of this session is to helping patients with diabetes to consider the benefits of exercises, types, duration and self-monitoring of blood pressure using Electronic Digital Blood Pressure Monitor.

Session 8: Included demonstration and redemonstrations about self-monitoring of body weight, blood pressure, blood glucose level on the chart and recording diet and physical activity. The goal of this session is to make patients with diabetes able and dependent to perform self-monitoring and recording in the right way.

Different teaching strategies were used by the researchers in each session. Such as modified interactive mini-lectures, small group discussions, role play, demonstration and re-demonstration using real life situations. Concerning the methods of evaluation used during training, they included asking questions, oral feedback and indirect observation.

Control group:

The control group received routine care including general information with ten statements about healthy food during Ramadan, but no advice on glycemc control.

4. Follow-up and evaluation phase:

- This phase lasted for 4 weeks after Ramadan. During this phase, both groups were followed by checking body mass index (BMI), systolic and diastolic blood pressure, lipid profile, HbA1c. Also, hypoglycemia questionnaire was filled.
- A follow-up interview (personal interviewing) was used for recording self-reported weights and blood glucose self-monitoring before, during and after Ramadan.

- Post-intervention period (after Ramadan) four follow up were conducted to assess blood glucose level, body weight, blood pressure and laboratory examinations (HbA1c and lipid profile) of the elderly people with diabetes. First follow-up was conducted immediately after Ramadan. Second follow-up was conducted one week later. Third follow-up was done one weeks after the second follow-up. And fourth follow-up was done one weeks after the third follow-up.

Statistical Analysis:

Data obtained from the elderly patients with diabetes were reviewed, coded and recorded. A statistical analysis was done. Utilizing the Statistical Package for Social Sciences (SPSS), version 20. A numerical data such as age was presented using mean and SDs. Categorical data have experimented with the Chi-square test (X^2) for qualitative variables. An independent sample ttest was used for quantitative variables. A P value <0.01 was considered a highly statistically significant difference.

3. RESULTS

Table (1) demonstrate a comparison between the intervention and control groups in relation to gender, age, level of education, duration of diabetes, management of diabetes and revealed that, there were no significant differences between intervention and control groups as regard to gender ($x^2=0.35$; $p=0.55$), age (65.1±12.7 years versus 66.1±11.1 years, respectively, where ($x^2=0.39$; $p=0.84$), level of education($x^2=4.63$; $p=0.33$), duration of diabetes (12.36±8.31years versus 12.2±8.7 years, respectively, where ($x^2=4.19$; $p=0.12$) and management of diabetes ($x^2=1.02$; $p=0.60$).

Table (2) clarifies that there were significant differences between intervention and control groups as regard to adjusted drug dosage and timings before Ramadan ($x^2=6.76$; $p=0.01$), exercise during Ramadan ($x^2=4.27$; $p=0.04$), pre-Ramadan doctor visit ($x^2=14.88$; $p=0.0001$) and during Ramadan doctor visit ($x^2=21.53$; $p=0.0001$).

Table (3) reveals that there were significant differences between intervention and control groups as regard to self-monitoring of blood glucose during Ramadan in relation to before Sahoor ($x^2=15.17$; $p=0.0001$), After Sahoor ($x^2=7.31$; $p=0.01$), before Iftar($x^2=5.31$; $p=0.01$) & After Iftar ($x^2=4.14$; $p=0.04$). While there were no significant differences between intervention and control groups as regard to self-monitoring of blood glucose during Ramadan in relation to day time ($x^2=0.23$; $p=0.63$) & night time ($x^2=0.35$; $p=0.55$).

Table (4) shows that there were no significant differences between intervention and control groups as regard to biochemical and body composition parameters pre Ramadan in relation to body weight ($T=1.17$; $p=0.24$), body mass index($T=0.20$; $p=0.83$), body fat mass ($T=0.19$; $p=0.84$), systolic blood pressure($T=1.36$; $p=0.17$), diastolic blood pressure($T=0.72$; $p=0.47$), HBA1C($T=1.6$; $p=0.10$), low-density lipoprotein cholesterol($T=0.83$; $p=0.41$), triglyceride($T=0.64$; $p=0.52$) and high-density lipoprotein cholesterol($T=1.31$; $p=0.19$). Meanwhile there were significant differences between intervention and control groups as regard to biochemical and body composition parameters post Ramadan in relation to body weight ($T=2.15$; $p=0.03$), body mass index($T=2.17$; $p=0.03$), systolic blood pressure($T=2.11$; $p=0.04$), diastolic blood pressure($T=2.19$; $p=0.02$), HBA1C($T=2.48$; $p=0.01$), low-density lipoprotein cholesterol($T=2.49$; $p=0.01$), triglyceride($T=2.09$; $p=0.04$) and high-density lipoprotein cholesterol($T=2.77$; $p=0.01$)

Table (5) reveals that, there were no significant differences between intervention and control groups as regard to dietary parameters pre-Ramadan in relation to daily energy intake ($T=1.34$; $p=0.18$), carbohydrates ($T=0.26$; $p=0.79$), protein ($T=0.33$; $p=0.74$), and fat ($T=0.99$; $p=0.32$). Meanwhile there were significant differences between intervention and control groups as regard to dietary parameters post Ramadan in relation to daily energy intake ($T=2.36$; $p=0.02$), carbohydrates ($T=2.98$; $p=0.01$) and fat ($T=2.31$; $p=0.02$).

Table (6) illustrates that there were significant differences between intervention and control groups as regard to hypoglycemia during Ramadan in relation to symptoms of hypoglycemia ($x^2=6.74$; $p=0.01$), frequency of hypoglycemia ($x^2=7.47$; $p=0.02$) & checked blood glucose level with hypoglycemia ($x^2=6.43$; $p=0.01$). in addition, there were significant differences between intervention and control groups as regard to hyperglycemia during Ramadan in relation to symptoms of hyperglycemia ($x^2=5.01$; $p=0.02$), the frequency of hyperglycemia ($x^2=6.01$; $p=0.04$) & checked blood glucose level with hyperglycemia ($x^2=4.76$; $p=0.03$).

Table (1): Comparison between the intervention and control groups in relation to their socio-demographic characteristics

Variables	Intervention Group (n=100)		Control Group (n=100)		X ²	P Value
	No	%	No	%		
Gender						
Females	37	37.0	32	32.0	0.35	0.55
Males	63	63.0	68	68.0		
Age (years)						
<60	21	21.0	24	24.0	0.35	0.84
60-69	47	47.0	47	47.0		
≥70	32	32.0	29	29.0		
Mean± SD	65.1±12.7		66.1±11.1			
Educational Level						
Read & write	20	20.0	12	12.0	4.63	0.33
Primary school	18	18.0	24	24.0		
Preparatory school	28	28.0	22	22.0		
Secondary school	18	18.0	20	20.0		
University	16	16.0	22	22.0		
Duration of Diabetes (years)						
Less than 10 years	27	27.0	23	23.0	4.19	0.12
10 to 20 years	40	40.0	54	54.0		
More than 20 years	33	33.0	23	23.0		
mean± SD	18.36±8.31		17.2±8.7			
Type of diabetic therapy used						
Oral medications	40	40.0	47	47.0	1.02	0.60
Insulin alone	28	28.0	24	24.0		
Oral medications & insulin	32	32.0	29	29.0		

Table (2): Comparison between the intervention and control groups in relation to their medication & medical follow up throughout Ramadan

Variables	Intervention Group (n=100)		Control Group (n=100)		X ²	P Value
	No	%	No	%		
Adjusted Drug dosage and timings during Ramadan						
Yes	40	40.0	22	22.0	6.76	*0.01
No	60	60.0	78	78.0		
During Ramadan Doctor Visit						
Yes	6	6.0	33	33.0	21.53	**0.0001
No	94	94.0	67	67.0		
Pre-Ramadan Doctor Visit						
Yes	43	43.0	17	17.0	14.88	**0.0001
No	57	57.0	83	83.0		
Exercise during Ramadan						
Yes	28	28.0	15	15.0	4.27	*0.04
No	72	72.0	85	85.0		
Physical Activity Scale Score (PASE)						
Pre Ramadan	155.7±62.3		153.4±64.5		0.24	0.81
Post Ramadan	182.2±82.1		159.2±50.6		2.39	*0.02

Table (3): Comparison between the intervention and control groups in relation to their self-monitoring of blood glucose throughout Ramadan

Self-Monitoring of Blood Glucose	Intervention group(n=100)				Control group (n=100)				X ²	P Value
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
Before Sahoor	47	47.0	53	53.0	20	20.0	80	80.0	15.17	**0.0001
After Sahoor	27	27.0	73	73.0	11	11.0	89	89.0	7.31	*0.01
During the day	29	29.0	71	71.0	25	25.0	75	75.0	0.23	0.63
Before Iftar	68	68.0	32	32.0	51	51.0	49	49.0	5.31	*0.02
After Iftar	46	46.0	54	54.0	31	31.0	69	69.0	4.14	*0.04
During the night	17	17.0	83	83.0	13	13.0	87	87.0	0.35	0.55

Table (4): Comparison between the intervention and control groups in relation to their hypoglycemia & hyperglycemia throughout Ramadan

Variables	Intervention Group (n=100)		Control Group (n=100)		X ²	P Value
	No	%	No	%		
<i>Suffering from Symptoms of Hypoglycemia</i>						
Yes	17	17.0	34	34.0	6.74	*0.01
No	83	83.0	66	66.0		
<i>The frequency of Symptoms of Hypoglycemia</i>						
Once/month	10	58.8	7	20.6	7.47	*0.02
Twice/month	6	35.3	23	67.6		
Thrice/month	1	5.9	4	11.8		
<i>Checked Blood Glucose Level with Hypoglycemia</i>						
Yes	15	88.2	16	47.1	6.43	*0.01
No	2	11.8	18	52.9		
<i>Suffering from Symptoms of Hyperglycemia</i>						
Yes	26	26.0	42	48.0	5.01	*0.02
No	74	74.0	58	58.0		
<i>The frequency of Symptoms of Hyperglycemia</i>						
Once/month	11	42.3	7	16.7	6.01	*0.04
Twice/month	10	38.5	19	45.2		
Thrice/month	5	19.2	16	38.1		
<i>Checked Blood Glucose Level with Hyperglycemia</i>						
Yes	19	73.1	18	42.9	4.76	*0.03
No	7	26.9	24	57.1		

Table (5): Mean and stander deviation of some physical and physiological parameters for elderly patients in the intervention and control groups

Parameters	Intervention Group (n=100)	Control Group (n=100)	T Test	P Value
	Mean± SD	Mean± SD		
Body weight (kg)				
Pre Ramadan	84.2±18.4	81.2±17.7	1.17	0.24
Post Ramadan	81.4±17.1	85.9±12.1	2.15	*0.03
Body Mass Index (kg/m²)				
Pre Ramadan	32.9±6.7	32.7±7.1	0.20	0.83
Post Ramadan	31.8±8.5	33.9±4.6	2.17	*0.03
Body Fat Mass (kg)				
Pre Ramadan	30.7 ± 12.9	30.4 ± 8.6	0.19	0.84
Post Ramadan	28.6 ± 7.5	30.0 ± 9.0	1.19	0.23
Systolic Blood Pressure (mmHg)				
Pre Ramadan	155.2 ± 18.9	158.6 ± 16.5	1.36	0.17
Post Ramadan	148.3 ± 8.4	152.6 ± 18.7	2.11	*0.04
Diastolic Blood Pressure (mmHg)				
Pre Ramadan	86.1 ± 6.3	87.0 ± 10.8	0.72	0.47
Post Ramadan	81.8 ± 7.4	84.2 ± 9.3	2.19	*0.04
HbA1c (%)				
Pre Ramadan	8.4 ± 2.0	8.9 ± 2.3	1.6	0.10
Post Ramadan	8.0 ± 1.6	8.8 ± 2.8	2.48	*0.02
Low-Density Lipoprotein Cholesterol; (mmol/L)				
Pre Ramadan	2.4±0.9	2.5±0.8	0.83	0.41
Post Ramadan	2.3±0.8	2.6±0.9	2.49	*0.02
Triglyceride; (mmol/L)				
Pre Ramadan	2.0 ± 1.2	2.1 ± 1.0	0.64	0.52
Post Ramadan	2.1 ± 0.6	2.4 ± 1.3	2.09	*0.04
High-Density Lipoprotein Cholesterol (mmol/L)				
Pre Ramadan	1.1 ± 0.7	1.2 ± 0.3	1.31	0.19
Post Ramadan	1.1 ± 0.6	1.3 ± 0.4	2.77	*0.01

Table (6): Mean and stander deviation of dietary parameters for elderly patients in the study and control groups

Parameters	Intervention Group (n=100)	Control Group (n=100)	T Test	P Value
	Mean± SD	Mean± SD		
Daily Energy Intake (kcal)				
Pre Ramadan	1408.5 ± 529.2	1515.9 ± 603.1	1.34	0.18
Post Ramadan	1477.0 ± 342.9	1599.2 ± 492.5	2.36	*0.02
Carbohydrates (gram)				
Pre Ramadan	220.0 ± 58.3	222.0 ± 69.4	0.26	0.79
Post Ramadan	200.6 ± 66.6	233.2 ± 86.6	2.98	*0.01
Protein (gram)				
Pre Ramadan	56.0 ± 15.9	56.7 ± 14.1	0.33	0.74
Post Ramadan	68.9 ± 28.8	64.1 ± 27.2	1.21	0.22
Fat (gram)				
Pre Ramadan	45.4 ± 17.6	48.6 ± 26.8	0.99	0.32
Post Ramadan	46.0 ± 15.5	51.5 ± 18.1	2.31	*0.02

4. DISCUSSION

Fasting for elderly people with diabetes remains a difficulty, especially in temperate environments through summer periods during the continuation of fasting is running. Nevertheless, several elderly people with diabetes like to fast without listening to warnings from health specialists. So, elderly people with diabetes requires an instructional program about feeding regimens and medication modification in Ramadan.

Considering a comparison between the intervention and control groups in relation to gender, age, level of education, duration of diabetes, management of diabetes, the current study result clarified that, there were no statistically significant differences between intervention and control groups. This could reveal that there were no differences between social characteristics that could influence the results of the study.

1-Regarding to medical Follow Up and Physical Exercise.

The current results revealed that there were significant differences between intervention and control groups as regard to adjusted drug dosage and timings before Ramadan, physical exercise during Ramadan, pre-Ramadan doctor visit and during Ramadan doctor visit. This study was consistent with **Karatoprak et al., (2013)** in his study “The effects of long-term fasting in Ramadan on glucose regulation in type 2 diabetes mellitus” who stated that securing enough control of plasma glucose through the fasting month of Ramadan remains a difficulty for both doctors and patients. This could illustrate the need for developed instructions about how blood glucose is affected by food eating and glucose lowering medication. Also, this study finding was supported by **Ahmedani et al., (2012)** in his study “Ramadan Prospective Diabetes Study: the role of drug dosage and timing alteration, active glucose monitoring, and patient education” who found that people who attended couple informative sessions on medication dosage and timing adjustment, glucose monitoring including dietary and lifestyle adjustments did not get any severe serious diabetic complications through Ramadan. This study finding is incongruent with a study by **Alotaibi, (2015)** in his study “A study on the needs for educating and managing fasting diabetes through mobile health in the Kingdom of Saudi Arabia” they found that two-thirds of peoples did not adapt their medication management, as well as their medication dosage through Ramadan. This may be due to the long fasting hours through Ramadan that are connected with inevitable variations in feeding rate and feeding behaviors, fewer meals with more calories. According both the dosage and timing of medication treatment do adapt equally.

2-Regarding Glycemia Control

The current result revealed that there were significant differences between intervention and control groups as regard to self-monitoring of blood glucose during Ramadan in relation to before Sahoor, After Sahoor, before Iftar & after Iftar. While there were no significant differences between intervention and control groups as regard to self-monitoring of blood glucose during Ramadan in relation to daytime & night time. This result was supported by **Ahmedani et al., (2014)** in his study “Implementation of Ramadan-specific diabetes management recommendations” who mentioned that the majority of people controlled their blood glucose levels already through observing their blood glucose level. This study result was also similar to **Thongsai & Youjaiyen, (2013)** In their studies “The long-term impact of education on diabetes for older people: a systematic review” they found that global education plans that concentrate on self-management of diabetes care have been shown in several studies to have a useful impact on the glycemic control. This study finding was similar to **Suliman et al., (2010)** in his study “Diabetes and fasting in Ramadan: can we provide evidence-based advice to patients?” who mentioned that the educational interference experienced by the studied patients was a multifaceted program directed by different specialties, tailored for individual requirements, and included any approved support for becoming diabetic control through Ramadan, including frequent glucose monitoring, medication and dose adjustments, proper meal plan, just maintain of physical activity, and situations that need breaking the fast. This could be due to the blood glucose monitoring through Ramadan was important for diabetic patient who want to fast, while this will encourage them to beak the fast if their blood glucose level decreased.

The findings of the present study illustrated that intervention group had fewer manifestation and frequencies of hypoglycemia during fasting in Ramadan than control group. These results were consistent with **Tourkmani et al., (2016)** in his study “impact of Ramadan focused education program on hypoglycemic risk and metabolic control for patients with

type 2 diabetes, Patient Preference, and Adherence” and **Chowdhury et al., (2017)** in his study “A survey of patients with type 2 diabetes and fasting outcomes during Ramadan”. who found that intervention group had less frequency of hypoglycemia than control group. Also, **Amin et al., (2016)** in his study “Life Style Practice and Awareness During Ramadan Fasting in Bangladeshi Diabetic Population” who observed that elderly people with diabetes who received educational intervention about nutrition had fewer episodes of hypoglycemia. Also, the results of the study clarified that intervention group had more controlled. The presents study found that intervention group had more control of hyperglycemia than control group. This finding is agreement with the result of **Bravis et al., (2010)** in his study “Ramadan Instruction and Awareness now Diabetes (READ)” program aimed at Muslims through type 2 diabetes who fast throughout Ramadan” and **Alotaibi, (2015)** in his study “A study on the needs for educating and managing fasting diabetes through mobile health in the Kingdom of Saudi Arabia”. they found that sixty percent of patients with diabetes had control for hyper glycemia after a planned health educational program for nutrition. However, these results could be attributed to the instructional program and methods of teaching encourage elderly people with diabetes to adhere to nutrition, exercise and medications. Also, the more frequent blood glucose monitoring might provide indications for continuing or breaking fasting

III- Regarding Nutrition and Body Composition Parameters:

This study finding clarified that intervention group had more near normal results related to body weight, body mass index, body fat mass, systolic blood pressure, diastolic blood pressure, HBA1C, low-density lipoprotein cholesterol, triglyceride, and high-density lipoprotein cholesterol than control group. This result was supported by **Chentli et al., (2013)** who studied the diabetes mellitus and Ramadan in Algeria and found that study group had no adverse effect for fasting in Ramadan as well as normal level for LDL, HDL, cholesterol, and cholesterol and triglyceride. In addition, **Tourkmani et al., (2016)** in his study “impact of Ramadan focused education program on hypoglycemic risk and metabolic control for patients with type 2 diabetes, Patient Preference, and Adherence” who mentioned that there was a real impact for pre – Ramadan focused education program on lipid profile levels. Also, this finding is agreement with the result of **Bravis et al., (2010)** in his study “Ramadan Instruction and Awareness now Diabetes (READ) program aimed at Muslims through type 2 diabetes who fast throughout Ramadan”. Who found that pre-program focus education was associated with more near normal weights for the intervention group. Although there was weight gain between control group. This result could be attributed to the control of food intake according to medical regimen and performance of exercises.

The current results revealed that there were significant differences between intervention and control groups as regard to dietary parameters pre-Ramadan in relation to daily energy intake, carbohydrates, protein, and fat. This study result was similar to **Khan et al., (2012)** in his study “consequences of Ramadan fasting and physical activity on glucose levels also serum lipid profile amongst type 2 diabetic patients” and found that the overall calorie expenditure decreased through Ramadan and the number of diets was reduced to twice every day. This may be due to the instructional program for elderly people with diabetes (intervention group) produced positive impact on nutrition habits and dietary parameters.

5. CONCLUSION

Elderly patients with diabetes who received Ramadan instructional program (intervention group) had more glycemic control than elderly patients who did not (control group).

6. RECOMMENDATIONS

- Specialized instructional program for glycemic control should be planned for elderly patients with diabetes before Ramadan.
- This program should use different teaching methods such as lectures, group discussions with small number of patients, demonstration and re-demonstration. Also, regarding the methods of evaluation, should include observation, direct questions and feedback.
- The importance of anti-hyperglycemic medication adjustment, meals, physical activity, and frequency of self-monitoring of blood glucose should be explained to the elderly patients with diabetes before Ramadan.

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