

# Effect of Instructional Guidelines on Short Term Outcomes for Adolescents with Diabetes Mellitus during Fasting Ramadan

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## ABSTRACT

*Short term clinical outcomes associated with Ramadan fasting for adolescent with uncontrolled diabetes include hypoglycemia, hyperglycemia with or without the risk of impending ketosis, dehydration, and thrombosis. **Aim:** This study aimed to evaluate the effect of instructional guidelines on short term outcomes for adolescents with diabetes mellitus during fasting Ramadan. **Design:** A quasi experimental design was used. **Setting:** This study was conducted at the outpatient diabetic Unit, affiliated to Ain Shams University Hospital. **Sample:** Randomly, study and control groups were allocated, they were 25 adolescent for each group who are fasting ramadan. **Tools:** 1) Interview questionnaire (pre/post), including 2parts:Part(1) Assessment of adolescent Knowledge regarding diabetes mellitus during fasting ramadan and Part (2)Assessment of adolescentsreported practice regarding diabetes mellitus during fasting ramadan, 2)Developinginstructional guidelines about diabetic management during Ramadan(post test). **Results:**There were statistically significant differences between the study and control groups as regards their knowledge about diabetes mellitus. As well, there were statistically significant differences between both groups regarding decrease short term outcomes post educational nursing guidelines. In addition, there were statistical significance differences were detected between both groups as regards adolescent' satisfaction and length resume of normal activity. **Conclusion:** The instructional guidelines were helpful on improvement of knowledge and reported practices of the adolescents with diabetes, which lead to decrease short term outcomes during fasting Ramadan. **Recommendations:** There is a need for sustained adolescents' educational sessions; and instructional guidelines should be available for all adolescents with diabetes mellitus and further studies should be done on a large number of subjects for evidence of results and generalization.*

**Keywords:** Diabetes mellitus, Fasting Ramadan, Short term outcomes, Instructional guidelines.

## I. INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterised by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The abnormalities in carbohydrate, fat, and protein metabolism that are found with diabetes are due to deficient action of insulin on target tissues. If ketones are

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present in blood or urine, treatment is urgent, because ketoacidosis can evolve rapidly (*American Diabetes Association, 2017*).

Ramadan is a lunar-based month, and its duration varies between 29 and 30 days. Muslims who fast during Ramadan must abstain from eating, drinking, use of oral medications, and smoking from predawn to after sunset; however, there are no restrictions on food or fluid intake between sunset and dawn. Most people consume two meals per day during this month, one after sunset and the other before dawn (*Ibrahim et al., 2015*).

Fasting is not meant to create excessive hardship on the Muslim individual according to religious tenets. Nevertheless, many patients with diabetes insist on fasting during Ramadan, thereby creating a medical challenge for themselves and their health care providers. It is increasingly important, that medical professionals be aware of potential risks associated with fasting during Ramadan and with approaches to mitigate those risks. These issues are rapidly becoming global issues, not only in Indonesia, Pakistan, and the Middle East, but also in North America, Europe, and Oceania (*Mohsin et al., 2015*).

The role of structured education for children is well established in the management of diabetes. This should be extended to Ramadan-focused diabetes education. Many Muslims with diabetes are very passionate about fasting during Ramadan. This passion is a golden opportunity to empower people with diabetes for better management of their diabetes, not only during Ramadan but also throughout the year. However, many health care professionals find that, they are unable to give the appropriate medical advice due to lack of knowledge about the optimum management of diabetes while fasting. Indeed, often people with diabetes feel that there is lack of harmony between the medical and the religious advice they receive. Hence, a Ramadan focused diabetes educational program should ideally include three components:

- 1) An awareness campaign aimed at children with diabetes, health care professionals, the religious and community leaders.
- 2) Ramadan-focused structured education for health care professionals.
- 3) Ramadan-focused structured education for adolescents with diabetes (*Byard, 2019*).

### **Significance:**

It is estimated that there are 1.1-1.5 billion Muslims worldwide, comprising (18-25%) of the world population fasting during Ramadan. Ramadan is the holy month of the Islamic year during which all healthy Muslims. Although children and sick people are exempted from fasting but many of this group, want to fast despite the medical advice against it. This includes a subset of adolescent with diabetes, which carries a considerable risk. Hypoglycaemia and hyperglycaemia are among the main hazards. Majority of Muslims with diabetes can fast safely during Ramadan; however some are placed at a greater risk. So it is very important to develop instructional guidelines before fasting to prevent complication during Ramadan.

## **II. AIM OF THE STUDY**

This study aims to assess the effect of instructional guidelines on short term outcomes for adolescents with diabetes mellitus during fasting Ramadan through:

1-Assessing of adolescent knowledge related to diabetes management and short term outcomes during fasting Ramadan.

2-Developing and implementing instructional guidelines for management of diabetes during fasting Ramadan.

3-Evaluating the instructional guidelines and its effect on Ramadan result in a safer fast for adolescent with diabetes mellitus.

**Research hypothesis:**

The current study hypothesized that:

The implementation of instructional guidelines for adolescent with diabetes mellitus will effect positively on short term out comes during fasting Ramadan.

### **III. SUBJECTS AND METHODS**

**Research Design**

Aquasiexperimental design was used to conduct this study.

**Study Settings**

This study was conducted at outpatient diabetic clinics affiliated to Ain Shams University Hospitals.

**Subjects**

A purposive sample was included 50 adolescents who fasting during Ramadan. The subjects was assigned to control (25) and study group (25) with the same characteristics.

**Inclusion criteria:**

- Age between (13-18) years
- Diagnosed with diabetes from one year at least regardless their educational level, residence and gender.

**Exclusion criteria:**

- Adolescents who unable to fast as adolescents with chronic disease, severe hypoglythemia or ketoacidosis within three months prior to Ramadan.

**Tools of the study:**

Tools were used in this study;

**Tool I- Questionnaire sheet:**

It was developed by the researcher after reviewing the related national and international literature. It was written in a simple Arabic language to suit the understanding level of the study subject.

It entails three parts as the following:

**Part I:** Socio demographic data of adolescent with diabetes mellitus as gender, age, level of education, and ranking

**Part II:** Medical history of adolescent with diabetes as present and past medical history, family health history and treatment regimen.

**Part III:** Adolescent knowledge regarding definition, causes, signs and symptoms, diagnosis and management of diabetes and complications of fasting as hypoglycemia, hyperglythemia, ketoacidosis, dehydration. The questioner consisted of (8) closed ended questions in form of Multiple Choice Question (MCQ) and (23) open ended questions in form of essay. It was adapted by the researcher based on (*Azizi et al., 2015; Hockenberry & Wilson, 2018*).

**Scoring system:**

A scoring system was followed to assess adolescent's knowledge related to diabetes management and short term outcomes during fasting Ramadan. The Questionnaire was contained of 30 questions, the total scores of these questions were 60 grades, the correct answer was scored as two point, the incomplete correct answer was scored as single point and the incorrect answer was scored as a zero point. These scores were summed and were converted into a percent score.

*It was classified into 2 categories:*

- **Satisfactory** level of knowledge if score  $\geq 60\%$ .
- **Unsatisfactory** level of knowledge if score  $< 60\%$ .

**Tool II- Self - Reported practice:**

It was adapted by the researcher based on *Perry & Potter, (2015)* and it revised by supervisors. This checklist was used to assess self-care practice as foot care, glucose monitoring, insulin injection and hygiene.

**Scoring system:**

A scoring system was followed to assess adolescents' self-care practice; each skill was assigned a score according to sub-items. The total score of reported practice were 73 grades, each item was evaluated as "done" was taken one score and "not done" was taken zero score. These scores were summed up and were converted into a percentage score. It was classified into 2 categories:

- **Satisfactory** level of knowledge if score  $\geq 75\%$ .
- **Unsatisfactory** level of knowledge if score  $< 75\%$ .

**Content and Face Validity and Reliability:**

- Face and content validity was ascertained by a group of seven experts from pediatric nursing department at faculty of nursing, Ain Shams University, their opinion will be elicited regarding format, accuracy, relevance of the tools to the aim and its appropriateness to achieve the objectives.

- Reliability analysis by measuring of internal consistency of the tool through **Cronbach's Alpha test**.

Tool	Cronbach's Alpha
Structured questionnaire format	0.754
Self - Reported practice	0.806

### Fieldwork

An approval was obtained from the director of Children's Hospital affiliated to Ain Shams University Hospitals. A letter was issued to them from the Faculty of Nursing, Ain-Shams University, explaining the aim of the study in order to obtain their permission and cooperation.

### Ethical Considerations

The research approval was obtained from the Faculty Ethical Committee before starting the study.

#### The ethical research considerations include the following:

- The researcher was clarified the objectives and aim of the study to adolescents included in the study before starting.
- Verbal approval was obtained from the adolescents before inclusion in the study; a clear and simple explanation was given according to their level of understanding. They secured that all the gathered data was confidential and used for research purpose only.
- The researcher was assuring maintaining anonymity and confidentiality of subjects' data included in the study
- The subjects were informed that they are allowed to choose to participate or not in the study and they have the right to withdrawal from the study at any time.

### Part I: Demographic data of the studied adolescents.

**Table (1):** Number and percentage distribution of the studied adolescents (study and control group) according to their demographic data.

Items	Study group (n=25)		Controlgroup (n=25)	
	No	%	No	%
<b>Gender</b>				
Male	10	40	16	64
Female	15	60	9	36

Age				
10<12 year	3	12	4	16
13-<15 year	10	40	8	32
15-18 year	12	48	13	52
$\bar{x} \pm S.D$	14.15 ± 7.5		13.98 ± 6.01	
Educationallevel				
Illiterate	1	4	2	8
Read and write	3	12	3	12
Preparatory	8	32	7	28
Secondary or Diploma	11	44	12	48
University education	2	8	1	4
Ranking in the family				
First	14	56	10	40
Second	3	12	5	20
Third	6	24	8	32
Fourth	2	8	2	8
Does your mobile have whats app				
Yes	15	60	13	52
No	10	40	12	48

This **table (1)** shows that, the mean age of the study group is  $14.15 \pm 7.5$  year, while the mean age of the control group is  $13.98 \pm 6.01$  year. Regarding to gender, 60% of the study group is females. While 64% of the control group are males. Regarding to educational level, (44% and 48%) of the study and control groups have secondary or diploma education, respectively. Moreover, (56% and 40%) of the study and control groups their ranking in the family is the first child, respectively. Also, (60% and 52%) of the study and control groups have whats app mobile application, respectively.

**Table (2):** Number and percentage distribution of the studied adolescent (study and control group) according to their clinical data. (n=30).

Items	Study group (n=25)		Controlgroup (n=25)	
	No	%	No	%
<b>Method of detection of the disease</b>				
From symptoms	14	56	13	52
From complications	8	32	10	40
Routine checkup	3	12	2	8
<b>How you behave when disease discovered?</b>				
Going to hospital	18	72	20	80
Go to the doctor	7	28	5	20
Consult your neighbors	0	0.0	0	0.0
Going to the mosque or the church	0	0.0	0	0.0
Taking medical herbs	0	0.0	0	0.0
<b>Time of discover the disease</b>				
Less 3 months	4	16	3	12
3-6 months	10	40	12	48
6-9 months	6	24	7	28
9-12 months	5	20	3	12
<b>Family history of diabetes</b>				
Yes	14	56	13	52
No	11	44	12	48
<b>Medical history from other disease</b>				

Yes	4	16	5	20
No	21	84	20	80
<b>Surgical history</b>				
Yes	3	12	4	16
No	22	88	21	84
<b>Type of medication you taking for diabetes</b>				
Insulin	25	100	25	100
Tablets	0	0.0	0	0.0
<b>Taking treatment for any other disease</b>				
Yes	4	16	5	20
No	21	84	20	80

This **table (2)** shows that, (56% and 52%) of the study and control groups diagnosed with diabetes from symptoms, respectively. Also, (40% and 48%) of the study and control groups discover the disease from 3-6 months, respectively. Moreover, (56% and 52%) of the study and control groups have family history of diabetes, respectively. Meanwhile, (100%) of the study and control groups treated with insulin, respectively.

**Table(3):** Comparison between the adolescent (study and control groups) at post instructional guidelines program regarding to their knowledge about diabetes.

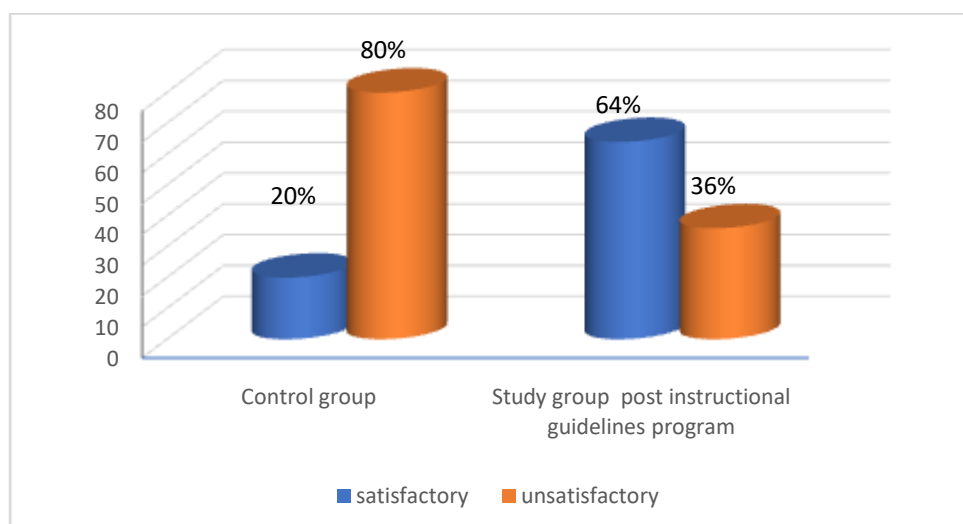
Items	Controlgroup (n=25)						Study group postinstructional guidelines program (n=25)						T.test	p- value
	Correct		Incomplete correct		Incorrect		Correct		Incomplete correct		Incorrect			
	No	%	No	%	No	%	No	%	No	%	No	%		
Definition of diabetes	3	12	5	20	17	68	16	64	6	24	3	12	24.19	.000**
Normal range of blood sugar	5	20	0	0.0	20	80	18	72	0	0.0	7	28	23.10	.001**



Diabetes is a controlled disease	5	20	0	0.0	20	80	20	80	0	0.0	5	20	24.92	.000**
Signs and symptoms of diabetes mellitus	3	12	7	28	15	60	19	76	4	16	2	8	23.84	.002**
Causes of diabetes mellitus.	4	16	4	16	17	68	16	64	5	20	4	16	25.18	.000**
Complications of diabetes.	3	12	6	24	16	64	15	60	7	28	3	12	26.02	.000**
Signs of hypoglycemic coma.	2	8	5	20	18	72	17	68	5	20	3	12	25.85	.000**
Symptoms that appear during fasting	4	16	6	24	15	60	18	72	3	12	4	16	27.30	.000**
When fasting is broken	0	0.0	5	20	20	80	15	60	7	28	3	12	26.89	.000**
When you have to measure blood sugar	3	12	7	28	15	60	14	56	6	24	5	20	25.18	.002**

This **table (3)** shows that, there is high statistically significant difference between the studied adolescent (study and control groups) regarding their knowledge level about diabetes post instructional guidelines program implementation at ( $P = < 0.01$ ).

**Figure (1):** Comparison between the adolescent (study and control groups) at post instructional guidelines program regarding to total self-care.



This **figure (1)** shows that, there is statistical difference between the studied adolescent (study and control groups) regarding total self-care post instructional guidelines program implementation.

**Table (4):** Distribution of study and control group related complication during Ramadan:

	Study group (n=25)		Control group (n=25)		T test P value
	N	%	N	%	
Hyperglycemia	6	24	11	44	4.986 .009**
Hypoglycemia	4	16	10	40	6.748 .004**
Diabetic ketoacidosis	3	12	8	32	5.963 .005**
Breaking fasting	6	24	14	56	7.110 .002**

**Table (4)** showed that 24% of studied group suffered from hyperglycemia, while 44% of control group. Also, it was revealed that only 16% of study group suffered from hypoglycemia, while 40% of control group. Related diabetic ketoacidosis, detected that 12% of study group suffered from it, while 32% of control group. And, 56% of control group exposed to breaking fast, compared to only 24% of study group exposed to breaking fast.

#### IV. DISCUSSION

Fasting during the holy month of Ramadan is one of the five pillars of Islam and is obligatory on all adult Muslims. Although the Quran states that, the sick are exempt from fasting there is a lack of consensus on the definition of “the sick”. Many people with diabetes do not view themselves as “sick” and are indeed able to fast. In pathophysiological terms fasting can pose significant risks to patients with diabetes and therefore health care professionals have debated for many years whether or not to consider diabetes as an absolute contraindication to fasting in Ramadan (*Beshya, 2012*).

Therefore this study was conducted to assess the effect of instructional guidelines on short term outcomes for adolescents with diabetes mellitus during fasting Ramadan.

The current study showed that, two thirds of the study group were females, while more than two thirds of the control group were males, the mean age of the study group was ( $14.15 \pm 7.5$ ) and for the control group it was ( $13.9 \pm 6.01$ ), and less than half of the study and the control groups had secondary or diploma as an educational level. Moreover two thirds of the study group and more than half of the control group had whats-App mobile application (**table 1**).

This was in agreement with (*Beshyah et al., 2011*), who studied “Practical management of diabetes during Ramadan Fasting” revealed that, two thirds of the studied group were females, less than half of them were in the age group (15-20 years old) with secondary educational level, and almost two thirds of them were the first child in their families and had what's-app mobile application.

The current work mentioned that, more than half of the study and the control groups had family history of diabetes and the disease was detected in both of them from symptoms, less than half of the study and the control groups discovered the disease for 3-6 months, and all of the study and the control groups treated with insulin (**table 2**).

This was supported by the study of (*Ahmedani et al., 2014*), which was about “Implementation of Ramadan-specific diabetes management recommendations: a multi-centered prospective study from Pakistan” reported that, more than half of the studied group discovered their disease from symptoms with positive family history of having diabetes, and all of them were taking insulin as a treatment.

Also the current work reported that, there was high statistically significant difference between the study and the control groups in their knowledge level about (diabetes, its complications, and its treatment) post instructional guidelines implementation (**tables 3**).

Patient education is a major step in coping with diabetes management. The current study showed the importance of the instructional guidelines and its implementation on the total knowledge level about diabetes of the study group, with no difference in the total knowledge level about diabetes of the control group as they didn't receive such an educational program.

The current work showed that, there was marked improvement in total self-care of the study group post implementation of instructional guidelines program. Also there was difference between the study and control groups regarding total self care post instructional guidelines program implementation (**Figure1**).

This was in agreement with *Al-Khawari et al. (2011)*, who studied “Adolescents on basal-bolus insulin can fast during Ramadan” mentioned that, regarding the total self care of the studied group, there was improvement post implementation of educational program regarding diabetes and fasting during Ramadan.

Regarding the impact of instructional guidelines on diabetes complications during fasting Ramadan, the current study revealed that, there was appositve correlation between implementation of instructional guidelines and decreasing the complications during fasting. (**table 4**)

This was in agreement with the study of *Ali et al. (2016)* with was about” Guidelines for managing diabetes in Ramadan” showed that, there was positive relation between implementation of instructional guidelines and decreasing the complications during fasting.

Provision of patient education program which includes care model is an effective and a sustainable measure way to raise the adolescents diabetic patients awareness and attitude towards the disease.

## V. CONCLUSION

**Based on finding of present study, it can be concluded that:**

Implementation of instructional guidelines has statistically significant positive effect on decreasing short term outcomes for adolescents with diabetes during fasting Ramadan.

## VI. RECOMMENDATION

**Based on the finding of this study, the following recommendation was inferred from the study:**

### **Recommendation related to adolescents:**

- I. Replication of the current study on larger probability sample is recommended to achieve generalization of the results and wider utilization of the instructional guidelines.
- II. Instructional guidelines for adolescents with diabetes during fasting Ramadan should be applied in all diabetic unit and should be up-dated periodically to prevent decline of adolescents and enhance self-care of those adolescents.
- III. A simplified, illustrated and comprehensive Arabic booklet including self-care guidelines should be introduced to the adolescents during Ramadan.

### **Recommendation related to research:**

- IV. Further research are recommended related to adolescents self-care to evaluate their improvement and prognosis during Ramadan.

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