EFFECT OF RAMADAN FASTING ON GLYCEMIC STATUS, LIPID PROFILE AND QUALITY OF LIFE IN TYPE I DM ADOLESCENT EGYPTIAN PATIENTS

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Article History: Received: 06.04.2023 **Revised:** 04.05.2023 **Accepted:** 09.05.2023

Abstract

Background: The ninth month of the lunar calendar is known as Ramadan, and it is during this time that Muslims make substantial modifications to their daily routines, including their eating, sleeping, and exercise habits. Very little research has been done on the effects of Ramadan fasting on people with Type 1 Diabetes Mellitus (T 1 DM), particularly adolescents.

Objectives: The purpose of this research was to determine whether or not fasting throughout Ramadan had any influence on the HBA1c, total cholesterol (TC), triglyceride (TG), low-density lipoprotein-cholesterol (LDL-c) and quality of life (QOL) of a group of Egyptian adolescents with T1DM.

Methods: This prospective cohort research was performed at Endocrinology outpatient clinic of (Internal medicine and pediatric department) El-Sayed Galal University Hospital, Cairo, Egypt, before and after Ramadan of Islamic year 1443 Hijri, (April / May 2022). The study was conducted on convenient sample of (T 1 DM) Egyptian adolescent's patients who accepted to share in research.

Baseline characteristics and HbA1c levels, TC, TG, and LDL-c were collected from all willing participants in the 4 weeks preceding Ramadan, an Arabic version of the WHOQOL-BREF questionnaire was administered.

All laboratory investigations and Psychometry were repeated within 1 to 2 weeks after Eid-ul-Fitr.

Results: Forty-nine (T1DM) patients age ranged from 10 to 18 years were included. HbA1c level of the patients before Ramadan, was 8.29 ± 1.14 % that changed to 7.91 + 1.11% after the Ramadan which indicates significant decrease of HbA1c when contrasting the time following Ramadan to the time before.

TC mean levels prior to and following Ramadan were 198.45±47.10 and 185.73±51.99 mg/dl respectively. The mean levels of TG before and after Ramadan were 206.08± 53.41 and 185.43±50.46 mg/dl respectively. The mean levels of LDL-c before & after Ramadan were 92.86±17.17 and 84.33±19.19 mg/dl respectively. There was significant decline in lipid profile after Ramadan compared to their levels before Ramadan.

Patients' self-reported (QoL) mean score before Ramadan fasting was 72.55± 10.84, and their mean score after Ramadan fasting was 93.06± 8.47. Total score of QoL showed significant increase after Ramadan than before Ramadan.

Conclusions: Ramadan fasting may have positive impact on HbA1c, (TC), (TG) level and (LDLc) in (T1DM) Egyptian adolescent patients. It may be also associated with improved QOL in (T1DM) Egyptian adolescent patients.

Recommendations: Respecting the psychological need for participating in Ramadan fasting on (T1DM) adolescents. Further large multi-center study is needed to explore effects other related variables on QOL among (T1DM) adolescent patients.

Keywords: Ramadan Fasting, Quality of life, adolescents and type I DM.

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DOI: 10.48047/ecb/2023.12.si4.715

1. INTRODUCTION

Fasting from dawn till sunset and other drastic adjustments to eating, sleeping, and exercising habits characterize the ninth month of the Islamic lunar calendar, known as Ramadan.[1]

It is customary for Muslims to abstain from food and drink from sunrise to sunset during the holy month of Ramadan. However, not all Muslims are expected to fast during Ramadan. The fasting obligation is waived for those who are elderly, pregnant, or otherwise unable to care for themselves while fasting. Even though people with certain illnesses and serious medical conditions, such as diabetes, are exempt from fasting, many still choose to do so. It is crucial that persons with diabetes who fast are provided with the right counseling and medical attention. [2]

Despite this, many people with diabetes wish to fast throughout Ramadan. [3]

Even outside the Ramadan fasting RF periods, managing T 1DM in children and adolescents is difficult. Despite this, many young people with T1DM are eager to fast throughout Ramadan and may do so successfully for several days. [4]

There is no universally accepted definition of QoL, which makes it challenging to quantify and include into scientific inquiry. Any definition should be comprehensive while still allowing for the separation of its constituent parts, as illness and its treatment affect not only a person's biological but also their mental, social, and financial health. This allows us to assess how various illness states or treatments affect QoL as a whole or in isolation. [5]

The World Health Organization defines QOL as "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in connection to their goals, expectations, standards and concerns"[6]

Fuhrer proposed that QOL, in contrast to health status, might be understood from the standpoint of the individual; this concept is now known as subjective QOL or subjective well-being. This category includes scales for rating one's own feelings of joy or sadness. [7]

QoL is a vital indicator of health and the endpoint of every healthcare project. It is assessed by one's level of physical and social activity, in addition to one's sense of bodily and mental health. [8]

Measuring QOL gives information useful in shaping clinical and health policy. The importance of QoL in determining the success of a therapy is becoming increasingly recognized, particularly in the context of specific disorders. [9]

Absolute insulin insufficiency and the subsequent hyperglycemia are hallmarks of type I diabetes, a chronic autoimmune illness. Over the past quarter century, researchers have made significant strides in understanding T1DM, resulting in a comprehensive understanding of the disease's genetics, epidemiology, immune and -cell phenotypes, and burden. [10]

Although T1DM has been traditionally defined as a disease of children and young adults, it can actually affect people of any age. [11] Typically, diagnoses occur most frequently in youngsters between the ages of 10 and 14. [12]

Worldwide, the incidence and prevalence of T1DM are both rising, at a rate of roughly 2% to 3% year. [13]

There is a lack of information regarding the prevalence of diabetes in Egypt. Nonetheless, the International Diabetes Federation reports that as of early 2020, Egypt had 8,850,400 adult cases with diabetes and an incidence of 15.2%. [14]

QOL in diabetes cases has become an area of focus in recent years. [15] In order to fully understand how a child's or adolescent's diabetes and its complex and demanding treatment regimen impacts them across the board, it is crucial to conduct an assessment of their quality of life. [16] The QOL for persons with diabetes is poorer than that of those without any chronic illness, but it is greater than that of people with the vast majority of other substantial chronic diseases, according to the study's authors. [8]

There are some studies that were conducted at some Islamic countries to evaluate Ramadan fasting effect on QOL. An Iranian study on 100 individuals aged more than 60 years found that the QoL of elderly Muslims improved through Ramadan fasting. [17]

An investigation carried out in Pakistan on 64 cases with hypothyroidism fasted for at least 20 days showed that following Ramadan, QOL scores rose in the areas of physical health, mental health, and social relationships. [1]

On the other hand Saudi study done on 37 epileptic patients reported that QoL scores were not affected by Ramadan fasting. 18

A similar result was seen in a Turkish research of 56 cases who had undergone a fecal stoma due to cancer and were randomly assigned to either a fasting (n = 14) or non-fasting (n = 42) group. According to the results, fasting throughout Ramadan had no substantial impact on QoL. [19]

Another Saudi study found that parents of adolescents (age range 8-18 years) with T1D perceived a lower QoL for their children during Ramadan fasting, especially in the treatment adherence and communication domains. [20]

There have been a number of research looking at Ramadan fasting and its effects on adults with DM, but less studies focusing on the pediatric population.

The study's goals were to (1) evaluate the impact of Ramadan fasting on glycemic control and (2) ascertain the clinical and metabolic consequences and QOL of teenagers with T1DM who insisted on fasting throughout Ramadan. We expected that the glycemic status and quality of life of Egyptian

adolescents with T1DM wouldn't change noticeably during the month of Ramadan.

2. SAMPLE AND METHODS

This cross-sectional research was performed at Endocrinology outpatient clinic of (Internal medicine and pediatric department) El-Sayed Galal University Hospital, Cairo, Egypt. During Ramadan of Islamic year 1443 Hijri, (April / May 2022). Fasting duration per day during the month ranged from 14 hours 19 minute to 15 hours 15 minutes. This study has been conducted on Convenient Sample of (T1DM) adolescent Egyptian patients who accepted to share in research.

Our Inclusion criteria were, being an Egyptian, (T1DM) patient (Confirmed by History of positive pancreatic islet auto-antibodies at diagnosis and/ Or recurrent ketosis), 10 to 18 years old, who fasted at least 20 days throughout the month of Ramadan, who accepted to share in research. Our sample included males and females, variable degree of glycemic control and variable duration of DM onset.

We have excluded Non-Egyptian patients, Type 2 diabetes mellitus (T2DM), patient less than 10 or older than 18 years, patients who fasted less than 20 days during Ramadan, critically ill patients, patients known to have any organic diseases that can leads to psychiatric symptoms (Hypothyroidism, hyperthyroidism, suprarenal gland dysfunction, hypocalcaemia, chronic renal and liver diseases, and organic brain condition), patients with preexisting depression/anxiety before the diagnosis of DM, Patients receiving any psychotropic medication, and patients with history of Psychoactive substance use e.g. Tramadol, Cannabis, Opioids and Benzodiazepines.

Participants were assured to eat Fotor meal immediately after the Maghrib call to prayer and to eat the Suhoor meal just before the dawn call to prayer.

Informed consent has been signed the patient or the joined adult 1st. degree relative in patients less than 16 years old to participate in the research after explaining the purpose.

The following was taken within 4 weeks before Ramadan and 1 to 2 weeks after Eid al-Fitr:

1- Medical history and physical examination (A brief medical history was recorded to collect demographic data involving age, sex, and related personal and familial information).

2- Participants were assessed for weight and height while wearing only their undergarments. The formula for calculating Body Mass Index (BMI) is weight in kilograms split by height in meters squared.

3- Hemoglobin A1c (HbA1c)

4- Lipids profile; TC, TG, and LDL-c.

5- Arabic version of the WHOQOL-BREF Questionnaire. It is a 26-item self-administered questionnaire designed for evaluating the 4 primary WHO QoL domains: physical health, psychological health, social relationships, and environment. [21]

It has satisfactory to outstanding psychometric characteristics for reliability and performs well in preliminary tests of validity. [22]

Multiple studies have evaluated the WHOQOL-BREF instrument's validity and reliability and deemed it a suitable tool for measuring QOL. 23,24

The Arabic version of the WHOQOL-BREF instrument was also evaluated and found to be valid and reliable among Arabic speakers. [25]

On a report form, clinical data was documented. These data were tabulated and analyzed using version 20 of the statistical software SPSS (Statistical application for social science). The data were given descriptive statistics in the form of the mean and standard deviation ± SD for quantitative data and the frequency and distribution for qualitative data.

Following establishing the non-normality of the groups using the Shapiro– Wilk test of normality, the statistical significance of the variances among the groups was assessed. Two experiments were utilized: Paired student t-test; utilized for contrasting related samples; Wilcoxon signed-rank test Rank test was utilized for contrasting two samples that were similar or matched, or to conduct a paired difference test of repeated measurements on a single sample to determine if their population mean ranks are distinct. A P value <0.05 was considered substantial, while >0.05 was considered statistically insignificant. In all analyses, a P value < 0.01 was considered substantial.

3. RESULTS

A total number of forty-nine patients who are diagnosed as (T1DM) with their age ranged from 10 to 18 years joined our study; 27 (55.1%) were male and, (22 44.9%) were females.

Statistical analysis results for differences in HbA1c% and BMI between the sample before Ramadan and after Ramadan fasting are shown in **Table (1).**

Table findings shows that mean HbA1c level of the patients before Ramadan, was 8.29 ± 1.14 % that changed to 7.91 + 1.11% after the Ramadan that indicates significant decrease of HbA1c after the fasting month of Ramadan, vs before.

The mean (BMI) of the patients were 24.00± 2.01 kg/m2 before Ramadan and 23.83±2.12 kg/m2 after Ramadan. BMI was not different before and after the Ramadan (p > 0.05).

Table (1): Statistical analysis results for differences in HbA1c % and BMI

		Mean	± SD	Median	IQR		Range		p- value
HbA1c %	Before Ramadan	8.29	1.14	8.3	7.9	8.8	6.0	11.5	**<0.001#**
	After Ramadan	7.91	1.11	8.0	7.0	8.3	5.8	11.0	
BMI (Kg/m2)	Before Ramadan	24.00	2.01	24.0	22.8	25.5	20.0	28.1	**0.205***
	After Ramadan	23.83	2.12	23.7	22.5	25.4	19.4	28.8	

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, # Wilcoxon Signed Rank Test, *Repeated T Test

Statistical analysis results for differences in TC (mg/dl), TG (mg/dl) and LDL-c (mg/dl) between the sample before Ramadan and after Ramadan fasting are shown **in Table (2),** which shows that TC mean levels before and after Ramadan were 198.45±47.10 and 185.73±51.99 mg/dl respectively. The mean levels of TG before and after Ramadan were 206.08± 53.41 and 185.43±50.46 mg/dl respectively. The mean levels of LDL-c before & after Ramadan were 92.86±17.17 and 84.33±19.19 mg/dl respectively. There was significant decline in lipid profile after Ramadan compared to their levels before Ramadan.

Table (2): Statistical analysis results for differences in TC (mg/dl), TG (mg/dl) and LDL-c (mg/dl)

		Mean	± SD	Median	IQR		Range		p- value
TC (mg/dl)	Before Ramadan	198.45	47.10	189.0	170.0	210.0	129.0	334.0	**<0.001#**
	After Ramadan	185.73	51.99	177.0	155.0	200.0	100.0	350.0	
TG (mg/dl)	Before Ramadan	206.08	53.41	189.0	169.0	235.0	137.0	366.0	**<0.001#**
	After Ramadan	185.43	50.46	188.0	140.0	200.0	123.0	300.0	
LDL-c (mg/dl)	Before Ramadan	92.86	17.17	93.0	86.0	100.0	50.0	133.0	**0.001***
	After Ramadan	84.33	19.19	80.0	70.0	100.0	50.0	140.0	

As demonstrated in the **table (3),** the results of psychological health domain showed that all questions related to this domain had significant increase after Ramadan than before Ramadan except for questions 5 and 26 that showed significant decrease after Ramadan than before Ramadan.

Table (3): Statistical analysis results for differences in psychological health domain

Psychological health domain		**Mean**	**± SD**	**Median**	**IQR**		**Range**		**p- value#**
Q1	Before Ramadan	2.82	1.27	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	3.84	1.05	4.0	3.0	5.0	1.0	5.0	
Q2	Before Ramadan	2.82	1.13	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.16	.94	4.0	4.0	5.0	1.0	5.0	
Q5	Before Ramadan	3.35	1.05	3.0	3.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	2.00	.96	2.0	1.0	2.0	1.0	5.0	
Q6	Before Ramadan	2.71	1.26	3.0	2.0	4.0	1.0	5.0	**0.001**
	After Ramadan	3.86	.94	4.0	3.0	5.0	2.0	5.0	
Q7	Before Ramadan	3.04	1.10	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.02	0.99	4.0	4.0	5.0	1.0	5.0	
Q11	Before Ramadan	2.92	1.08	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.06	1.01	4.0	3.0	5.0	2.0	5.0	
Q19	Before Ramadan	3.06	1.20	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.35	0.86	5.0	4.0	5.0	2.0	5.0	
Q26	Before Ramadan	3.57	0.94	3.0	3.0	4.0	2.0	5.0	**<0.001**
	After Ramadan	1.82	0.83	2.0	1.0	2.0	1.0	4.0	
Total	Before Ramadan	18.65	3.15	19.00	16.0	20.0	13.00	25.0	**0.002**
	After Ramadan	20.10	2.01	20.00	19.0	22.0	16.00	24.0	

The results of physical health domain showed that all questions related to this domain had significant increase after Ramadan than before Ramadan except for question 4 that showed significant decrease after Ramadan than before Ramadan as demonstrated in **table (4)**

Table (4): Statistical analysis results for differences in physical health domain

Physical health domain		**Mean**	**± SD**	**Median**	**IQR**		**Range**		**p- value#**
Q3	Before Ramadan	2.57	0.96	3.0	2.0	3.0	1.0	4.0	**<0.001**
	After Ramadan	3.94	1.03	4.0	4.0	5.0	1.0	5.0	
Q4	Before Ramadan	3.04	1.06	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	2.04	1.08	2.0	1.0	3.0	1.0	5.0	
Q10	Before Ramadan	2.88	1.09	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	3.88	1.09	4.0	3.0	5.0	1.0	5.0	
Q15	Before Ramadan	2.76	1.07	3.0	2.0	4.0	1.0	5.0	**0.001**
	After Ramadan	3.84	1.07	4.0	3.0	5.0	1.0	5.0	
Q16	Before Ramadan	3.14	1.19	3.0	2.0	4.0	1.0	5.0	**0.015**
	After Ramadan	3.76	1.28	4.0	3.0	5.0	1.0	5.0	
Q17	Before Ramadan	2.92	1.06	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.00	1.10	4.0	4.0	5.0	1.0	5.0	
Q18	Before Ramadan	2.96	0.89	3.0	3.0	3.0	1.0	5.0	**0.519**
	After Ramadan	3.02	0.83	3.0	3.0	3.0	1.0	5.0	
Total	Before Ramadan	20.27	3.06	20.00	18.00	22.00	15.00	28.00	**<0.001**
	After Ramadan	24.47	3.12	25.00	23.00	27.00	16.00	31.00	

The results of Social relationship domain showed that all questions related to this domain had significant increase after Ramadan than before Ramadan as shown in **table (5).**

Table (5): Statistical analysis results for differences in social relationship domain

Social relationship domain		**Mean**	**± SD**	**Median**	**IQR**		**Range**		**p- value#**
Q20	Before Ramadan	2.53	1.04	3.0	2.0	3.0	1.0	5.0	**<0.001**
	After Ramadan	3.88	1.09	4.0	4.0	5.0	2.0	5.0	
Q22	Before Ramadan	2.73	1.15	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	3.90	1.25	4.0	4.0	5.0	1.0	5.0	
Total	Before Ramadan	5.27	1.32	5.00	4.00	6.00	3.00	8.00	**<0.001**
	After Ramadan	7.78	1.94	8.00	7.00	9.00	3.00	10.00	

The scores for Question No. 21, which states (How satisfied are you with your sexual life), have been excluded, as it is not applicable to all sample respondents.

The results of environmental domain showed that all questions related to this domain had significant increase after Ramadan than before Ramadan as demonstrated in **table (6)**

Table (6): Statistical analysis results for differences in environmental domain

Environmental domain		**Mean**	**± SD**	**Median**	**IQR**		**Range**		**p- value#**
Q8	Before Ramadan	2.92	1.19	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.06	.92	4.0	4.0	5.0	1.0	5.0	
Q9	Before Ramadan	2.86	1.10	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.00	1.08	4.0	3.0	5.0	1.0	5.0	
Q12	Before Ramadan	2.94	1.16	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.12	1.11	4.0	4.0	5.0	1.0	5.0	
Q13	Before Ramadan	3.53	0.84	4.0	3.0	4.0	2.0	5.0	**<0.001**
	After Ramadan	4.08	1.13	4.0	4.0	5.0	1.0	5.0	
Q14	Before Ramadan	3.18	1.09	3.0	3.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	3.94	1.03	4.0	4.0	5.0	1.0	5.0	
Q23	Before Ramadan	2.88	1.09	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.12	1.09	4.0	4.0	5.0	1.0	5.0	
Q24	Before Ramadan	2.82	1.22	3.0	2.0	4.0	1.0	5.0	**<0.001**
	After Ramadan	4.18	0.93	4.0	4.0	5.0	2.0	5.0	
Q25	Before Ramadan	2.63	1.17	3.0	2.0	3.0	1.0	5.0	**<0.001**
	After Ramadan	4.20	0.89	4.0	4.0	5.0	2.0	5.0	
Total	Before Ramadan	23.76	5.73	25.0	20.0	27.0	13.0	37.0	**<0.001**
	After Ramadan	32.71	4.34	33.0	31.0	35.0	18.0	39.0	

The mean QoL before Ramadan was 72.55± 10.84 that changed after Ramadan to have a mean of 93.06± 8.47. Total score of QoL showed significant increase after Ramadan than before Ramadan as shown in **table (7)**

Table (7): Statistical analysis results for variances in total QOL scores

Quality of life		Mean	± SD	Median	IQR		Range		p- value#
Total score	Before Ramadan	72.55	10.84	76.0	64.0	80.0	52.0	90.0	**<0.001**
	After Ramadan	93.06	8.47	95.0	90.0	98.0	66.0	105.0	

4. DISCUSSION

The reason for doing this research was to look at the impact of Ramadan fasting on the blood levels of glycated hemoglobin (HbA1c), BMI, TC, TG, LDL-c, and QoL among T1DM Egyptian adolescent patients how insist to participate in Ramadan fasting.

Consistent with prior research, our research found a substantial decrease in blood sugar levels, as measured by HbA1c (P< 0.001). 26,27,28,29 This contradicts the findings of other research that found a worsening of glycemic control following Ramadan, determined by an increase in HbA1c. 30,31 Fasting throughout Ramadan has been shown to have no effect on HbA1c in other research. 32,33 Fasting during Ramadan could enhance glycemic control in insulin-dependent diabetics, or at least have no negative effect. 34

Present research shows positive effects of Ramadan fasting on Total cholesterol (TC) (P<0.01), this is matching with findings of previous studies. 27, 28,35,36

Our study reported positive effects of Ramadan fasting on Triglyceride level (P<0.01), which goes on line with findings reported by previous studies. 27,35,36

Present research shows positive effects of Ramadan fasting on LDL-c (P<0.001). These results were consistent with the observations made by previous researchers. 27,28,35,36

It is evident from the present research that the benefits of Ramadan dietary habits in terms of reductions in TC, TGs, and LDL-c levels are transitory and may only be beneficial if the diet pattern is regularly structured in accordance to the routine followed during Ramadan. The variation in lipid levels observed by additional research may be attributable to seasonal and national differences in dietary habits and fasting duration.

On the other hand our study results revealed non-significant reduction in BMI (P 0.205), this is in line with results reported by Muammar et al. 33

In the current research, QOL total scores of (T1DM) adolescents increased significantly after Ramadan contrasted with before Ramadan. Our study found also that, scores of psychological health domain, physical health domain, social relationship domain, and environmental domain of (T1DM) adolescents had significant increase after Ramadan than before Ramadan.

During the holy month of Ramadan, the spiritual atmosphere of Islamic communities is heightened and the mental health of community members is likely to be affected by the performance of religious tasks (such as abstaining from immoral activities and soul cleaning). 37 The results of the present research are consistent with those of Guillaume Fond et al., who found that fasting enhanced mood and QOL. 38

Nugraha (2017) assessed the effect of fasting on mood, tiredness and health-related QOL in non-fasting and fasting groups of healthy young males and found no substantial variations among the research groups. 39

Our results may be explained by the fact that those cases who maintained their fasts tended to have stronger religious beliefs. If so, this might imply that the strength gained through religious beliefs has the potential to positively impact health and wellbeing, 40 and that spiritual well-being can improve QOL. 41

Our results are different from that reported by a recent Saudi study that found that parents of adolescents with (T1DM) perceived a lower QoL for their children during Ramadan Fasting, especially in the treatment adherence and communication domains. 20

This difference may be explained by due to the difference in the environment between the two studies and the evaluation method, as our current study relied on the patient's opinion, while the Saudi study relied on the parents' impression.

Our research's main advantages were its population-based design and use of real-world data, while its main disadvantages were its single-center nature and the possibility that selection bias affected the glycemic profile excursion due to its location in a clinic specializing in the management of DM. Further, the research was conducted on older children and adolescents who have T1DM and chose to fast throughout Ramadan, thus the limited sample size may have biased the results.

5. CONCLUSION

This research provides important insight into how young people make their own decisions about whether or not to observe Ramadan fasting, based on factors such as social and cultural norms that may or

may not align with religious guidelines. There is a substantial difficulty for healthcare professionals.

The current research found positive impact of Ramadan fasting on HbA1c, (TC), (TG) level and (LDLc) in (T1DM) Egyptian adolescent patients. Ramadan fasting was also associated with improved QOL in (T1DM) Egyptian adolescent patients, but had non-significant effect on (BMI).

Fasting during Ramadan may be beneficial for the physical and emotional health of adolescents with T1DM if they speak with their primary care physician before beginning the fast. In spite of sense of well-being; respecting the patient need for shearing in Ramadan fasting allowing for (T1DM) to become closely adhere to physician recommendations, healthy life style behaviors, medications and strict follow up.

5. RECOMMENDATIONS

Respecting the psychological need for participating in Ramadan fasting on (T 1 DM) adolescents having positive impact on the overall metabolic parameters.

Ramadan Fasting allowance cannot be generalized across to all (T 1 DM) adolescent patients.

Psychological and metabolic state in (T 1 DM) adolescent patients are closely correlated, so physicians caring for (T 1 DM) should be trained to recognize and deal about psychological problems, as it is essential for metabolic control.

Further large multi-center study is needed to explore effects other related variables e.g. gender, residency and socio economic standard on QOL among type I DM adolescent patients.

6. CONFLICTS OF INTEREST

The authors declare that they have no financial or intimate connections that could have affected their writing in an inappropriate manner.

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