Acta Scientific Pharmaceutical Sciences (ISSN: 2581-5423)

Volume 2 Issue 12 December 2018

Research Article

Effect of Health Education on Compliance of Diabetic Children Type 1 to Diabetes Management Regime in Fakus, Al-Sharkia, Egypt

Mohammed El-Hady Imam Salem*, Ahmed Said Hafez, Mahmoud Mohammed Shabaan

Department of Public Health and Community Medicine, Faculty of Medicine, Al-Azhar University, Egypt

***Corresponding Author:** Mohammed El-Hady Imam Salem, Department of Public Health and Community Medicine, Faculty of Medicine, Al-Azhar University, Egypt.

Received: September 27, 2018; **Published:** November 08, 2018

Abstract

Background: Type 1 diabetes is a heterogeneous disorder characterized by destruction of pancreatic beta cells, culminating in absolute insulin deficiency. Type 1 diabetes accounts for 5–10% of the total cases of diabetes worldwide. Compliance to the treatment reduces the chance of development of diabetes complications. Glycosylated hemoglobin (HbA1c) is the main indicator of the compliance to the treatment through health educational program.

Objectives: To identify socio-demographic characteristics of type I diabetic children in Fakus City, Al-Sharkia Governorate, Egypt, to identify factors affecting compliance of diabetic children and their families, to evaluate the effect of health educational sessions on the compliance of diabetic patient to the diabetes management regime.

Subjects and Methods: An intervention study was carried out on a sample size of 220 children including, with confirmed diagnosis of type 1 diabetes attending and following in pediatric outpatient diabetic clinic during the period of study at Fakus General Hospital and Fakus Health Insurance Hospital, Al-Sharkia Governorate, Egypt.

Results: This study showed that there is improvement of score of the knowledge and mean level of HbA1c after the educational sessions. So, there is compliance to the treatment. It was found also that the predictors such as (age, residence and socioeconomic level) affect improvement of HbA1c levels.

Conclusion: This study shows that there is improvement in levels of HbA1c after the educational sessions. So, there is compliance to the treatment. There is association of improvement of HbA1c level and studied risk factors as (age, residence and socio-economic level).

Keywords: Type 1 Diabetes; Health Educational Program; Glycosylated Hemoglobin

Introduction

Diabetes is a multifactorial disease, resulting from the interaction of environmental and genetic factors. It is characterized by persistent hyperglycemia, which is caused by insufficient secretion or in adequate peripheral action of insulin [1].

Type 1 diabetes is the most frequent metabolic illness in pediatric age. Diagnosis of type 1 diabetes means a radical change in life style for a family. It is necessary to consider not only the psychological state of the patient, but also the entire family [2].

Type 1 diabetes is accompanied by multiple squeals, including long-term macro- and micro vascular complications [3].

The medium- and long-term complications of diabetes mellitus can be very harmful, like micro vascular, macro vascular and neuropathic pathologies, which can lead the patient to renal failure, vision problems, amputations, myocardial infarctions and cerebrovascular events [4].

Adherence to treatment reduces the chance of development of these complications. Many factors affect adherence to the treat-

ment such as social support, psycho-social stress, family functioning, marital quality, number of visits to diabetes clinic and the quality of interaction with health care providers [5,6].

Non-adherence to the treatment may result in poor metabolic control and may increase the risk of ketoacidosis in adolescents and young adults [7,8].

Glycosylated hemoglobin [HbA1c] is the main indicator of the compliance to the treatment, long term glycemic control in patients with type 1diabetes and a predictor of diabetic complications [9].

The concentration of HbA1c, formed through the attachment of glucose to hemoglobin, is commonly considered to reflect the mean glucose level over the previous 8 - 12 week [10-12].

Acceptable level of HbA1c in peripheral blood, should be in range according to the American Diabetes Association (ADA) indicates values lower than 7%, while the Brazilian Diabetes Society (SBD) suggests an index below 6.5% [13].

The main focus of this study is to investigate the compliance of diabetic patient type 1to the treatment by using HbA1c as indicator of hyper glycemic control.

Rationale of this study: Type 1 diabetes is the most common chronic metabolic disease of childhood, there is strong association between the long-term glycemic control and the risk of micro vascular complications. Improved glucose control delays the onset and slows the progression of diabetes-related complications. Glycosylated haemoglobin is the main indicator of long term glycemic control in patients with type 1diabetes and a predictor of diabetic complications. HbA1c values > 7.5% are significantly associated with an increased risk of micro vascular complications. Therefore, HbA1c values ≤ 7.5% are recommended as the treatment goal in children and adolescents with type 1 diabetes. Educational sessions will be applied through this study to evaluate compliance to treatment of type1diabetes mellitus as measured by HbA1c.

Subjects and Methods

Administrative design

Ethical consideration

The study was approved by the Ethical Committee of the Faculty of Medicine, Al-Azhar University; an official permission letter was obtained and directed to the administrators in the randomly selected hospitals (Fakus General Hospital and Fakus Health Insurance Hospital), Al-Sharkia Governorate.

- **Consent:** the study was conducted after explaining to the participants the steps of the study and its objectives then health care giver provided informed oral consent. Only those who agreed were included.
- **Autonomy:** every patient has the right to participate or refuse to share in the study.
- **Beneficially:** any benefit to the child in the form of management of his illnesses was carried out.

Any patient refusing was not exposed to any harm.

Communication with local authorities

This communication aims to orient the health authorities about the objectives and procedures of the study in order to get an official permission for conduction of the study.

Technical design

Type of study

This study is an interventional study, (pre- and post-intervention stages).

Time of study

The study was conducted in the time frame from the first of November 2016 to the end of August 2018.

Study sitting

Diabetes outpatient clinics at Fakus General Hospital and Fakus Health Insurance Hospital, Al-Sharkia Governorate, Egypt.

The Target population

Children, including both males and females, with confirmed diagnosis of type 1 diabetes attending and following up pediatric outpatient diabetic clinic during the period of study at Fakus General Hospital and Fakus Health Insurance Hospital, Sharkia Governorate, Egypt.

Inclusive criteria

- Citizen of Fakus (rural and urban).
- Diabetic for at least one year.
- Age 5-15 years.
- They/their families agree to attend Health Education ses sions.

- Registered type 1 diabetic patients in diabetic clinics.
- On insulin or hypoglycemic drugs.
- Visiting the clinic regularly for treatment or follow up.

Exclusion criteria

- Citizen from outside Fakus.
- Diabetic for less than one year.
- Age out of the age group (5 - 15 years).
- They/their families don't agree to attend Health Education sessions.
- Not registered in the diabetic clinics.
- Unable to visit the clinic for any reason during the period of the study.

Sampling technique

- Pre and post intervention study were used.
- The researcher went to the chosen diabetic clinics of the chosen hospitals two days per week, at these days every patient attending the clinics and fulfilling the inclusive criteria was included in the study.
- All participants at the selected hospitals were received education messages on knowledge about type 1 diabetes mellitus, some associated risk factors, and importance of keeping HbA1c within the normal level.

Sample size

According to Epi-info program version 7.2 and based on the following parameters:

- Population size = 500
- Expected frequency = 50%
- Confidence limits = 5%
- Design effect = 1.0
- Number of clusters = 2

The total Sample size was =220 child (110 child from each of the selected hospitals.

Data collection

The data was collected using an interview questionnaire in the pre- and post-intervention stages to assess knowledge and practices of children themselves of their age more than 12 years and health care providers of children less than this age towards type 1 diabetes.

The data of the questionnaires were classified, summarized and statistically analyzed using appropriate statistics (SPSS version 20).

The operational design

Preparatory phase

This phase lasted from the first of November 2016 till the end of April 2017, it was devoted to:

- The literature reviews.
- Getting the approval of the local authority to carry out the study.
- Designing of questionnaires.
- Designing of the checklist.
- Taking permission from the supervisors on the questionnaire to start working.
- Performing of Pilot study and fieldwork.

Phase of data collection

- The fieldwork for this study extended through 4 months from the first of June 2017 until the end of August 2017.
- All illegible children coming to the hospital were chosen during each study setting. The two selected hospitals were visited every Monday and Wednesday weekly. The researcher begins with Fakus General Hospital for 2 months then Fakus Health Insurance Hospital for another 2 months.

Analysis and reporting phase

This phase included:

- Statistical analysis of the collected data.
- Writing up the thesis.
- Submission of the thesis for evaluation.

Statistical design

Two types of statistics were done:

- Descriptive statistics [e.g. percentage (%), mean (x) and standard deviation (SD)],
- Analytic statistics: which include the following tests:
  1. Chi-square test (χ^2): was used to study the association between two qualitative variables.
  2. T-test: is a test of significance used for comparison between two groups normally distributed having quantitative variables.
  3. McNemar's test: a statistical test was used to compare between two paired nominal data.

P-value of < 0.05 was considered statistically significant.

Study time table

Preparatory phase	11/2016 - 2/2017
Pilot study	3/2017 - 4/2017
Data collection	5/2017 - 8/2017
Data entry	7/2017 - 10/2017
Analysis of data	9/2017 - 3/2018
Interpretation of data	4/2018 - 6/2018
Final phase	7/2018 - 8/2018

Table 1

Results

This chapter deals with the analysis of various socio-demographic and background statistical variables, the diabetes related factors: including analysis of the disease family history, duration of diabetes, presence of complications, life style factors, the anthropometric measurements and lab tests results of the study sample. Also, the results displayed comparison between anthropometric measurements and lab tests before and after conducting the educational program intervention, comparisons between the mean level of HbA1c before and after conducting the educational intervention, association between HbA1c improvement and the studied risk factors and finally comparison between knowledge scores before and after conducting the educational intervention.

Table 2 shows that, male children constituted 43.2% while female children constituted 56.8% of the total sample. Children aged 10-15 years constituted the majority of the total sample 54.5%, while children aged 5- < 10 years constituted 45.5%. Most of studied children 61.4% were living in rural area while the other children (38.6%) were living in urban areas. The table also shows that 27.7% of children were before school, 33.2% were primary school and 39.1% were preparatory school. The family size of most of studied children 61.4% was 2 - 4 persons, while the other children 25% were 5 - 7 persons and 13.6% were 8+persons. The table also shows that 39.1% of studied children were of high socioeconomic level, 33.2% were of middle socioeconomic level and 27.7% were of low socioeconomic level.

Variable	No n = 220	%
Sex		
1) Male	95	43.2
2) Female	125	56.8
Age in years:		
1)5-	100	45.5
2)10- 15	120	54.5
M ± SD = (10.18 ±3.04)		
Residence		
1)Urban	85	38.6
2)Rural	135	61.4
Level of education		
1) Before school	61	27.7
2) Primary school	73	33.2
3) Preparatory school	86	39.1
Family size		
1) 2 - 4 persons	135	61.4
2) 5 - 7 persons	55	25.0
3) 8 + persons	30	13.6
M ± SD = (5.25 ± 2.01)		
Family income		
1) <1000 EG pound	10	2.3
2) 1000- EG pound	90	34.1
3) 2000- EG pound	50	29.5
4) 3000- EG pound	60	29.5
5) 4000+ EG pound	10	4.5
M ± SD= (2211.36 ± 856.49)		
Socioeconomic level*		
1)low socioeconomic	61	27.7
2)middle Socioeconomic	73	33.2
3)high Socioeconomic	86	39.1

Table 2: Distribution of studied children according to their socio-demographic characteristics.

Table 3 shows that, the majority of the mothers 40.9% were secondary educated and about one fourth 27.3% were institute or college and 22.7%, 9.1% were of basic education and illiterates respectively. The table also shows that the majority of the fathers 47.7% were secondary educated and 29.5% were institute or college educated and 20.5%, 2.3% was of basic education and illiterates respectively. Regarding parental occupation, the majority of the mothers 54.6% were house wife's and 31.8%, 13.6 were employed and free works respectively. On the other hand, the majority of the fathers 59.1%were free workers, 38.6% were employed and only 2.3% were jobless. There was no consanguinity in most of studied children 65.9%.

Variable	No n= 220	%
Mother education		
1) Illiterate	20	9.1
2) Basic Education	50	22.7
3) Secondary Level	90	40.9
4) Institute or college	60	27.3
Mother occupation		
1) Housewife	120	54.6
2) Employed	70	31.8
3) Free works	30	13.6
Father education		
1) Illiterate	5	2.3
2) Basic Education	45	20.5
3) Secondary	105	47.7
4) Institute or college	65	29.5
Father occupation		
1) Employed	85	38.6
2) Free works	130	59.1
3) Jobless	5	2.3
Consanguinity		
Yes	75	34.1
No	145	65.9

Table 3: Distribution of studied children according to their parental characteristics

Table 4 shows that 40.9% of studied children had previous diabetes education and the educator was a doctor in 77.8% of studied children, nutrition specialist in 16.6% and self-education in only 5.6% of studied children. The education was about type of treatment in 94.4%, time of treatment in 50%, nutrition in 55.6%, importance of practices in 50% and importance of periodic examination in 50%; and about 77.8% of studied children followed medical instructions after taking the previous health education.

Table 5 shows that the percentage of children who have physical activity at home after intervention 86.4% was more than before intervention 34.1% with statistically significant difference P =.000. regarding types of physical activity at home; the percentage of children who have hard working, light working, walking and standing after intervention 36.8%, 47.4%, 15.8% and 7.9% respectively were more than the percentage before intervention

Variable	No n = 220	%
Previous diabetes education		
1) Yes	90	40.9
2) No	130	59.1
	N = 90	
Educator		
1) Doctor	70	77.8
2) nutrition specialist	15	16.6
4) self-education	5	5.6
Education about		
1) Type of treatment?	85	94.4
2) Time of treatment?	45	50
3) Type of nutrition?	50	55.6
4) Importance of practices?	45	50
5) Importance of Periodic examination?	45	50
Following instructions		
1) Yes	70	77.8
2) No	20	22.2

Table 4: Distribution of studied children according to Health Education Information

0%, 26.7%, 53.3% and 20% with statistically significant difference P = .002. The table also shows that the percentage of children who have physical activity at school after intervention 97.7% was more than before intervention 90.9% with statistically significant difference P =.004. The table also shows increase in the number of children playing with the others, Participate in exercise lessons after intervention 14%, 79.1% respectively than before intervention 0%, 50% respectively with statistically significant difference P =.015. Regarding meals number the percentage of children who have 2, 3, 4+ meals/day after intervention 16.8%, 73.6%, 9.5% respectively were more than the percentage before intervention 15.9%, 72.7%, 11.4% with no statistically significant difference. regarding snakes the percentage of children who have snakes after intervention 95.5% was more than before intervention 29.5% with statistically significant difference P =.025. Regarding meals regularity; the percentage of children who have regular meals after intervention 86.4% was more than before intervention 54.5% with statistically significant difference P =.005. The table also shows the majority of studied children 45.6% were interested in reading the food label after intervention than before 27.3% with statistically significant difference P =.014.

Variable	Before Intervention (n = 220)		After Intervention (n = 220)		*P-Value
	NO	%	NO	%	
Physical activity at home					
1)yes	75	34.1	190	86.4	.000
2)no	145	65.9	30	13.6	
Type of Physical Activity at home (no before=75, no after190)					
1) standing	15	20	15	7.9	.002
2) walking	40	53.3	30	15.8	
3) Light working	20	26.7	90	47.4	
4) hard working	0	0	70	36.8	
Physical activity at school					
1) yes	200	90.9	215	97.7	.004
2) no	20	9.1	5	2.3	
Type of Physical Activity at school (no before=200, no after215)					
1) Walking to school	100	50.0	100	46.5	.015
2) playing with others	100	50.0	170	79.1	
3) exercise lessons	0	0	30	14	
Number of meals					
2) 2	35	15.9	21	9.5	
3) 3	160	72.7	162	73.6	.122
4) 4+	25	11.4	37	16.8	
Eating between meal					
1)yes	65	29.5	180	81.8	.025
2)no	155	70.5	40	18.2	
Meal regularity					
1) yes	120	54.5	190	86.4	.005
2) no	100	45.5	30	13.6	
Reading the food label					
1) Much attention	15	6.8	85	38.7	
2) interest	60	27.3	100	45.6	.014
3) don't care much	35	15.9	20	9.2	
4) don't care at all	110	50	10	4.5	

Table 5: Life style factors at pre and post educational intervention program.

Table 6 shows that the number of insulins unites after intervention was slightly lower than the percentage before intervention with statistically significant difference p =.000. Regarding time of treatment the majority of studied children 40.9%, 38.6% were taking the treatment twice per day and 3 times/day after intervention which was slightly lower than the percentage before intervention 43.2%, 36.4% with statistically significant difference P =.025. The table also shows that the majority of studied children 97.7% after intervention have regular treatment than before intervention 47.7% with statistically significant difference p =.000. Regarding change site of treatment, the majority of studied children 90% were change the site of treatment after intervention than before 47.7% with statistically significant difference p =.000. Regarding treatment site disinfection the majority of studied children 90% were disinfect the site of treatment after intervention than before 25% with statistically significant difference p =.000. Regarding home monitoring of blood sugar most of studied children 52.3% had home monitoring of blood sugar after intervention than before 41% with no statistically significant difference.

Variable	Before Intervention (n = 220)		After Intervention (n = 220)		*P-Value
	NO	%	NO	%	
Insulin unites (n = 200)					
1) 5-	30	13.6	45	20.5	
2) 20-	90	40.9	95	43.2	.000
3) 40+	80	36.4	60	27.3	
Time of treatment					
1) once/day	45	20.5	45	20.5	.025
5) twice/day	95	43.2	90	40.9	
4) 3 times/day	80	36.4	85	38.6	
Treatment regularity					
1) Yes	105	47.7	215	97.7	.000
2) No	115	52.3	5	2.3	
Treatment site change (n = 200)					
1) Yes	105	47.7	180	90	.000
2) No	95	43.2	20	10	
Treatment site disinfection (n = 200)					
1) Yes	55	25	180	90	.000
2) No	145	65.9	20	10	
Home monitoring of blood sugar					
1) Yes	90	41	115	52.3	.061
2) No	130	59	105	47.7	

Table 6: treatment related factors at pre and post educational intervention program

Table 7 shows that the majority of studied children 88.6% have normal BMI after intervention which is more than the percentage before intervention 75% with no statistically significant difference. The table also shows that the majority of studied children 95.5% have normal FBS after intervention which is more than the percentage before intervention 25% with statistically significant difference P = .000. The table also shows that the majority of studied children 50% have good glycemic control after intervention which is more than the percentage before intervention 13.6% with statistically significant difference P =.000. The table also shows that the majority of studied children 97.7% have normal level of cholesterol and triglycerides after intervention which is more than the percentage before intervention 72.7% with statistically significant difference P =.000.

These figure shows that the percentage of studied children with poor glycemic control before educational massage was 31.8% and after educational massage was 15.9%, the percentage of studied children with fair glycemic control before educational massage was 54.5% and after educational massage was 34.1%, the percentage of studied children with good glycemic control before educational massage was 13.6% and after educational massage was 50%.

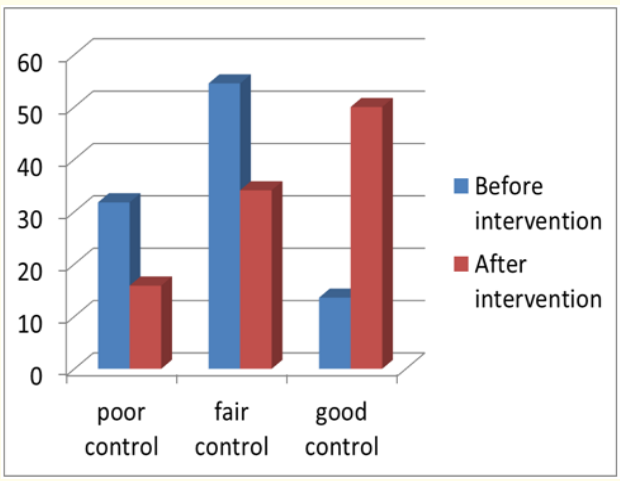

Figure 1: Effect of health educational program on level of HbA1c (before and after) the educational message.

These figure shows that mean of HbA1c level before the educational message is 7.463, mean level after the educational message is 6.775.

Variable	Before Intervention (n=220)		After Intervention (n=220)		*P-Value
	NO	%	NO	%	
BMI					
1) Underweight (< 5th per)	30	13.6	15	6.8	
2) Normal (5th -< 85th per)	165	75	195	88.6	.854
3) Overweight (85th -< 95th per)	25	11.4	10	4.5	
Fasting blood sugar (FBS)					
1) Hypoglycemia (< 60)	65	29.5	10	4.5	
2) Normal (60 - 110)	55	25	210	95.5	.000
3) Hyperglycemia (>110)	100	45.5	0	0	
Glycosylated hemoglobin (HbA1c)					
1) Good control (5.4 - 6.8)	30	13.6	110	50	.000
2) Fair control (6.9 - 7.6)	120	54.5	75	34.1	
3) poor control (> 7.6)	70	31.8	35	15.9	
Cholesterol					
1) Normal (< 200)	160	72.7	215	97.7	
2) Border line (200 - 240)	55	25	5	2.3	.000
3) High (> 240)	5	2.3	0	0	
Triglycerides					
1) Normal (< 150)	160	72.7	215	97.7	
2) Border line (150 - 200)	55	25	5	2.3	.000
3) High (> 200)	5	2.3	0	0	

Table 7: anthropometric measures and lab tests at pre and post educational intervention program

Table 8 shows that there was no statistically significant association between sex, level of education, consanguinity and improvement response of HbA1c. On the other hand, there was statistically significant association between age, residence, family size, socioeconomic level and improvement response of HbA1c. Regarding age; improvement response of HbA1c was more in 5- < 10 years 77.8% than in 10 - 15 years 50% with statistical significant asso-

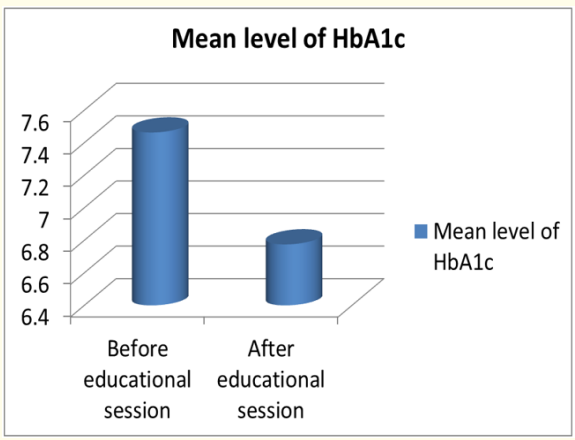

Figure 2: Effect of health educational program on mean level of HbA1c (before and after) the educational message.

ciation P =.000. Regarding residence; improvement response of HbA1c was more in urban 75% than in rural; 52.4%, with statistically significant association P = .05. Regarding family size; improvement response of HbA1c was more in small families 72.7% than in large families 60%, 33.3% with statistically significant association P = .001. Regarding Socioeconomic level; improvement response of HbA1c was more in high Socioeconomic 81.6% than in middle and low socioeconomic level 69.5%, 30.9% with statistically significant association P = .001.

This figure shows that in low socioeconomic level (17 children are improved from 55 children), in middle socioeconomic level (41 children are improved from 59 children) and in high socioeconomic level (62 children are improved from 76 children.

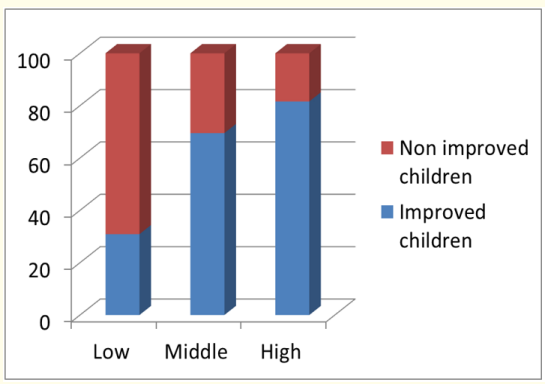

Figure 3: Association of HbA1c improvement with socioeconomic levels of the studied children.

Risk factors	Improvement response of HbA1c (N = 120)	Non improvement response of HbA1c (N = 70)	P value
Sex			
1) Male	50	25	.418
2) Female	70	45	
Age:			
1) 5- < 10 years	70	20	.000
2) 10 - 15 years	50	50	
Residence			
1) Urban	60	20	.05
2) Rural	55	50	
Level of education			
1) Before school	30	14	
2) Primary school	43	25	.684
3) Prep. school	47	31	
Family size			
1) 2 - 4 persons	80	30	
2) 5 - 7 persons	30	20	.001
3) 8 + persons	10	20	
Socioeconomic level			
1) low socioeconomic	17	38	.000
2) middle Socioeconomic	41	18	
3) high Socioeconomic	62	14	

Table 8: Association of HbA1c improvement with the studied socio-demographic characteristics and parental characteristics

Table 9 shows that there was no statistically significant association between acute complication and improvement response of HbA1c. On the other hand, there was statistically significant association between age of onset, disease time, family history and improvement response of HbA1c. Regarding age of onset; improvement response of HbA1c was more in 5-10years 66.7% with statistically significant association P =.012. Regarding disease time; improvement response of HbA1c was more in short duration of the disease (< 5years) was 76.9% than in long duration (5 - 10years, > 10 years) were 64.3%, 45.5% with statistically significant association P = .000. Regarding family history; improvement response of

HbA1c was more in positive family history 77.8% than in negative family history with statistically significant association P = .022.

Risk factors	Improvement response of HbA1c (N = 120)	Non improvement response of HbA1c (N = 70)	P value
Age of onset			
1) < 5years	90	50	
2) 5 - 10years	30	15	.012
3) > 10years	0	5	
Disease time			
1) < 5years	50	23	
2) 5 - 10years	45	25	.000
3) > 10years	25	30	
Family history			
1) yes	35	10	.022
2) no	85	60	
Acute complication			
1) yes	60	35	1.00
2) no	60	35	
Type of acute complications			
1) Hypoglycemia	25	10	
2) hyperglycemia	15	10	.432
3) both	20	15	

Table 9: Association of HbA1c improvement with the studied Diabetes related factors.

Table 10 shows that there was no statistically significant association between type of treatment, person giving the treatment, Insulin type, insulin unites, time of treatment, treatment site change, treatment site disinfection, and periodic medical examination and improvement response of HbA1c. On the other hand, there was statistically significant association between treatment regularity and home monitoring of blood sugar. Regarding treatment regularity; improvement response of HbA1c was more in children having treatment at regular times 64.9% with statistically significant association P =.003. Improvement response of HbA1c was more in children having home monitoring of blood sugar 63.6% with statistically significant association P = .05.

Risk factors	Improvement response of HbA1c (N = 120)	Non improvement response of HbA1c (N = 70)	P - value
Insulin unites			
1) 5-	15	5	
2) 20-	45	35	.090
3) 40+	50	20	
Time of treatment			
1) once/day	25	10	
5) twice/day	45	35	.216
4) 3 times/day	50	25	
Treatment regularity			
1) Yes	110	65	.003
2) No	10	5	
Treatment site change			
1) Yes	60	35	.056
2) No	50	25	
Treatment site disinfection			
1) Yes	30	20	.256
2) No	80	40	
Home monitoring of blood sugar			
1) Yes	70	35	.05
2) No	40	25	
Periodic examination			
1) Yes	60	40	.210
2) No	50	30	

Table 10: Association of HbA1c improvement with the treatment related factors.

This figure shows that the mean score of the knowledge before the educational message is 52.023 and the mean score of the knowledge after the educational message is 66.023.

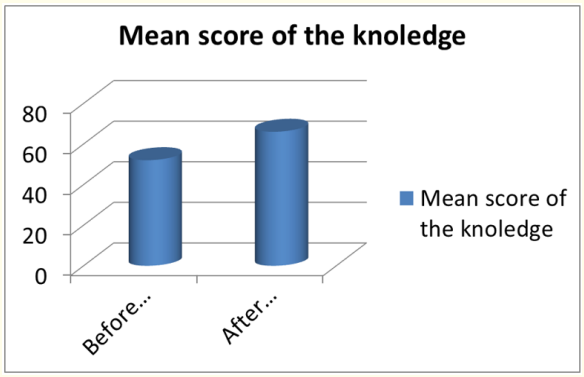

Figure 4: Effect of health educational program on mean score of the knowledge (before and after) the educational message.

Discussion

DM type 1 is one of the most factors of morbidity and mortality among children [4].

This arouses the interest to conduct the current study with the main goal to improve the compliance of type I diabetic children and their families to diabetes management regime in Fakus City, Al-Sharkia Governorate helping the promotion and development of health status of this group of population.

The number of female participants is higher than the number of males (125 and 95 respectively). This reflects the fact that the female's attendance to diabetic center is higher than male's attendance. These finding is in constant with worldwide reports in this respect [14].

In addition, 61.4% of sample living in the rural areas; this may because of the highest percentage of the patients visiting the clinic are from the villages. And also, may be due to the highest percentage of rural people in Egypt which is 56% while people living in urban eras represent only 44%. Moreover, the mean number of family member was 5.25.

Furthermore, the sample clarifies that half of the participants with low-and middle socioeconomic status. These findings indicate that the diabetic patients are among worse economic situation 54% of patients were at age 10 - 15 years of adolescent; may be due to during this phase there is insulin insensitivity and higher HbA1c levels. So, it is needed to more frequent attending to adjust insulin dose and reducing HbA1c levels. Or may be due to all the children in our database were treated at a single clinic and the sample we studied was relatively small. It is also possible that children diagnosed more recently would have received more intensive initial management. This similar to that founded by Harjutsalo., *et al.* [15] as the findings suggest that preadolescent girls may have higher HbA1c levels at diagnosis, possibly linked to their pubertal status; thus confirm previous findings concerning the increased incidence with age of type 1 diabetes which was reported to show an increased incidence with age through the childhood and adolescence but decrease during adulthood [16].

The peak of incidence of type 1 was represented with a mean age of 4.52 years which markedly lower than reported in USA and other counters (American Associated Diabetes, 1998; Barbara H Scott, 1997). This might be partially due to variations in feeding habits or environmental factors; Or due to ARI.

34.1% of patients reported to have first degree consanguinity such findings are constant with that reported by Amy Adams MS [17].

Most of parents of studied children are secondary educated 47.7%, but their knowledge of the disease was excellent. Their scores are high even before intervention. This could be due to the long duration of the disease. These finding similar to Vimalavathini., *et al.* [18] where majority of patients had only primary or were illiterate, their knowledge was excellent, due to long duration of the disease (nearly 8 - 9 years).

The majority of the occupation of fathers of studied children are working free works as they may be working in small jobs, so, they could not buy sufficient amount of insulin or going to the hospital to get their free insulin as they cannot even find the resources to travel to the hospital on a regular basis. This similar to Vimalavathini., *et al*. [18] where the majority of the patients were working in menial jobs and belong to the economically weaker section of the society.

More children have long disease duration and the mean duration of type 1 diabetes was 7.34 years and this is similar to Urbach., *et al.* where the mean of the duration is about five years.

59.1% of studied sample had no diabetes education before and this indicates the importance of this study to evaluate the effect of health educational sessions on the compliance of diabetic patient to the diabetes management regime.

65.9 of studied sample had no physical activity at home which increase to become 86.4% after intervention and this was associated with improvement of HbA1c level. This is findings similar to Urbach., et al. where the physical activity was associated with improvement of HbA1c level and decrease in the disease complications.

As regard reading the food label; 60% of studied children don't care about reading the food label which decrease to become 13.7% after intervention and this was associated with improvement of HbA1c level. This is findings were expectable as reading the food label give information about type of food components and the safe one and This is similar to Urbach., *et al.* where reading the food label was associated with improvement of HbA1c level and decrease in the disease complications.

72.7% of studied children reported that they ate three meals daily which is nearly the same after intervention 73.6. On the other hand, 29.5% of the sample ate between meals (more snacks) which increase to become 81.8% after intervention. And 54.5% of the studied sample is interesting in meal timing which increases to become 86.4% after intervention. These findings were associated with improvement of HbA1c level and this is similar to Vimalavathini., *et al.* [18] where meal timing was associated with improvement of HbA1c level and decrease in the disease complications.

About 18% of population was having hypoglycemia, which is the most common medical emergency for adiabatic child in whom progression of the case may lead to brain damage or death. On the other hand, about 15.9% of patients had episodes of hyperglycemia in which persistent of it will lead to early appearance of irreversible diabetic complications.

The blood lipids in this research were identified as total cholesterol and triglycerides. The results showed the discipline of these lipids before educational intervention, where 72.7% of the sample had normal cholesterol and triglycerides level; this can be attributed to several reasons including the duration of diabetes in 50% of study sample were than less four years or, may be due to genetic factors. These findings are similar to Vimalavathini., *et al*. [18] where most of the children were having good normal cholesterol and triglycerides level.

The body weight was measured before and after educational intervention program for study sample as well as body mass Index was assessed. The results related to BMI showed no significant decrease. The results of this research were in consistence with the results of earlier studies on the effect of diabetes education on weight loss which affects positively on body mass index. The researcher Davis and others found a greater weight loss 2.98kg in intervention group compared with 1.85 kg in control group at 4 and 12 months follow up from the beginning of group structured diabetes educational program [19].

The researchers D Jermy and others also discovered a significant reduction in mean weight and BMI in the intervention group and increased in control group in a controlled clinical study either community based or group centered public health addressing nutrition and exercise in Costa Rica [20].

HbA1c levels reflect the average level of glucose control over the period of two to three months. The outcomes of diabetes education intervention was measured in terms of Hemoglobin A1c which was compared with the participants following the diabetes educational program instructions HbA1c is considered normal or good controlled when the value is less than 6.8%. In this study, at least 31.8% of the participants had poor control of their diabetes. This is in agreement with the results of MOH 2008 report where found 80% of patients registered in diabetic clinics in PHCC had poor control of their diabetes which indicates a poor self-management for diabetic patients in this study and this may be due to lack of knowledge about the disease [21].

The mean of HbA1c level before the education message is high 7.46% and is lowered to some extent to become 6.77% after the educational message (Table 10); paired t test is used and shows that there is improvement in reduction in HbA1c levels. Improve levels of HbA1c after the educational sessions. It is similar to NICE, 2003 where four studies were found: two randomized controlled trials (RCTs) and two controlled clinical trials (CCTs). Only one study of a purely educational intervention was found that there is no any beneficial effect of education, as the sample size was very small. The other three studies reviewed the effect of the educational session in reduction of HbA1c level maybe they adjusted their insulin dose, there is family support, their practice was good, following specific diet and their score of knowledge was high.

The gender didn't affect HbA1c level and these was in opposite to Kitzler., *et al.* [22] where female gender higher HbA1c level because in female patients the influence of hormone cycling has to be considered as it causes insulin resistance. Women also require higher doses of insulin during the gestated phase due to a decreased sensitivity to insulin in the peripheral fat tissue.

The age was associated with higher levels of HbA1c and these was Similar to Hochhauser., *et al.* this may be consistent with an earlier study that reported that during puberty there is insulin resistance due to sex steroid hormones and growth hormones which antagonize effect of insulin. Furthermore, during this period, the diabetes management behavior changes; many parents stop supervising their children. It is the "opportunity for non-compliance" that places adolescents at risk for poorer glycemic control Similar to Genuth [23].

The socio-economic level was associated with improvement in levels of HbA1c as in high socio-economic level, aggression and conduct problems can interfere with the adolescent's ability to follow the rules associated with the diabetes regimen such as administering insulin at the right times and following a diet, which in turn can lead to poor metabolic control. There is limited research on relationships between mental health and adherence behaviors among adolescents with type 1 diabetes mellitus. If males are more likely to have externalizing symptoms, they may also be more likely to have poor adherence and metabolic control. Moreover, female had poorer metabolic control due to depression and anxiety. Therefore, although more studies seem to suggest that male adolescents are at higher risk for poor health outcomes, the data is by no means clear [24].

The improvement in HbA1c level was more in high socioeconomic level because all services were available as they could get their insulin without travelling, highly educated and they had more knowledge.

The disease duration affect improvement of HbA1c level as the improvement was more in short duration of the disease (< 5 years) and this result were in accordance with Gerstl., et al. where that the best HbA1c levels were achieved in the first 2 years after diagnosis; a minority of the children even reached normal HbA1c values. Longer duration of diabetes is significantly associated with higher HbA1c levels. The longer duration of diabetes in the groups with poorer metabolic control may have had an adverse effect on therapy adherence. Duration of diabetes may affect metabolic control and therapy adherence adversely. Shorter duration relates to greater family and social support, which may translate into better therapy adherence with improved metabolic control. Additionally, in longstanding diabetes counter-regulation is impaired more frequently and the risk for severe hypoglycemia increases. Patients already have problems integrating therapy algorithms into their daily order and additional unstable metabolic conditions may increase emotional distress, which in turn may contribute to poor adherence [25].

There was association between residence and HbA1c level; May be due to that in the rural areas, the patients were not in a position to travel in a fasted state from long distances to avail this facility of having free insulin. Since most of these patients were either unemployed or had menial jobs and has to come from far-off places, travelling even once a month due to their meager financial resources. To counter their inability to come regularly, nearly 91% of the patients either reduced their daily insulin dose, so that they could adjust with the number of vials dispensed to them for some more days, or did not take insulin at all. Only small percentages of these patients buy their insulin, if they cannot come to get their insulin [18].

But in urban, the patients may have problems integrating therapy algorithms into their daily order and additional unstable metabolic conditions may increase emotional distress, which in turn may contribute to poor adherence [25].

Also in urban, there is may be limited research on relationships between mental health and adherence behaviors among adolescents with T1DM. As males are more likely to have externalizing symptoms (conduct and aggression behavior), moreover in females had poorer metabolic control due to depression and anxiety. They may also be more likely to have poor adherence and metabolic control [24].

But improvement in HbA1c level is more in urban. It may be due to that in urban all services were available as they could get their insulin without travelling, highly educated and they had more knowledge.

The mean of score of education after the message (66.023) is higher than before the message (52.023) (Table). Paired t test before and after message is P =0.000 so, it is highly significant. So, there is improvement of score of education after the educational sessions. It is similar to Couch., *et al.* 2008 to determine the effectiveness of diabetes education on metabolic control for children with type 1 diabetes and their families. As the results of two studies examining refinements to intensive therapy education suggest that educational interventions may enhance the effects of intensive diabetes management in reducing HbA1c (Couch., *et al*. 2008).

In our study sample 43.2% were reported to have problem in getting their insulin dose in time (Table) and this was mainly due to difficulties in reaching clinics as a result of the financial causes. This is expected to complicate the health status of these patients and is expected to induce complications at earlier stage of life.

Most patients reserved insulin injection as the only mode of treatment on monthly bases. Insulin doesn't care diabetes nor prevent its eventual effect of complications. Insulin is just allowing person.

Daily practices aiming at improving health status through the control of blood sugar seems to have a noticeable effect to stay alive [26].

Conclusions

- This study shows that there is improvement in levels of HbA1c (decreased) after the educational sessions and there is an association of improvement of HbA1c level and studied risk factors as (age, residence and socioeconomic level)
- This study found that the most affecting factor on improvement of HbA1c is the socioeconomic level and there is improvement of score of knowledge after the educational sessions.
- The present work indicates that the health services provided to type 1 diabetes are still not to optimum, efforts should be made to improve health services, change bad behavior and reinforce good ones.

Recommendations

1. Awareness by the importance of diabetes education and also by that treatment of diabetes in children should involve every aspect of a child's life, as well as that of his/her family life.
2. Awareness by the constraints for a better health care and providing the insulin at points nearer to their homes, like at the primary health centers or through the village health workers may have better impact.
3. Further research is needed to determine the most effective way of training for healthcare professionals to provide health educational program to type 1diabetes in children and young people.

Bibliography

1. Boule., *et al*. "Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: meta–analysis of controlled clinical trials". *JAMA* 286 (2001): 1218-1227.
2. Larsen ML., *et al*. "Effect of long-term monitoring of glycosylated hemoglobin levels in insulin-dependent diabetes mellitus". *The New England Journal of Medicine* 323.15 (1990): 1021-1035.
3. Schoenle., *et al*. "Impaired intellectual development in children with Type I diabetes: association with bHbA(1c), age at diagnosis and sex". *Diabetologia* 45 (2002): 108-114.
4. American Diabetes Association. "Diagnosis and classification of diabetes mellitus". Position statement. *Diabetes Care* 27 (2004): 4-10.
5. Bryant W., *et al*. "Diabetes guidelines: easier to preach than to practice?" *The Medical Journal of Australia* 185.6 (2006): 305-309.
6. Lehman R., *et al*. "Tight control of blood glucose in long standing type 2 diabetes". *The BMJ* 338 (2009).
7. Toljamo M and Hentinen M. "Adherence to self-care and glycaemic control among people with insulin-dependent diabetes mellitus". *Journal of Advanced Nursing* 34 (2001): 780-786.
8. Krapek K., *et al*. "Medication adherence and associated hemoglobin A1C in type 2 diabetes". *Annals of Pharmacotherapy* 38 (2004): 357-362.
9. Krishnamurti U., *et al*. "Glycohemoglobin: a primary predictor of the development or reversal of complications of diabetes mellitus". *Clinical Chemistry* 47.7 (2001): 1157.
10. Saudek., *et al*. "Glycated hemoglobin (HbA1c) as a stable indicator of Type 2 diabetes". *JAMA* 295 (2006) 1688-1697.
11. "American Diabetes Association". *Diabetes Care* 30 (2007): S4-41.
12. American Diabetes Association. "Standards of medical care in diabetes". *Diabetes Care* (2007): S4-41.
13. Andriolo A and Vieira. "Diagnostic acompanhamento laboratorial no diabetes mellitus". In: Andriolo A, org. Guias de medicinaambulatorial e hospitalar: medicina laboratorial. São Paulo: Manole (2008).

14. National Diabetes Data Group. Diabetes in America. 2nd edition Bethesda, Md.: National institute of health, national institute of diabetes and digestive and kidney disease; NIH publication no. 95-1468 (1995).

15. Harjutsalo., *et al*. "Time trends in the incidence of type 1 diabetes in Finnish children: a cohort study". *Lancet* 371 (2008): 1777-1782.

16. National Electronic Library for Health, diabetes information for healthcare professionals. Nel Diabetes-Prevention Risk factors for type 1 Diabetes (2001).

17. Amy Adam MS. what is type 1 diabetes? Reviewed by Jeremy Walston, MD and Krieti Silver MD Genetic Health (2000).

18. Vimalavathini R., *et al*. "Educational program for patients with type-1 diabetes mellitus receiving free monthly supplies of insulin improves knowledge and attitude, but not adherence". *International Journal of Diabetes in Developing Countries* 28.3 (2008): 86-90.

19. Davies M., *et al*. "Effectiveness of the Diabetes Education and self-Management for ongoing and newly diagnosed type 2 diabetes: cluster randomized controlled trial". *BMJ* (2008).

20. Jermy D., *et al*. "Randomized Controlled Community-Based Nutrition and Exercise Intervention Improves Glycaemia and Cardiovascular Risk Factors in Type 2 Diabetic Patients in Rural Costa Rica". *Diabetes Care* 26.1 (2003): 24-28.

21. Ministry of Health, Department of Chronic Diseases Report, Result Analysis of Investigation Forms for Diabetes Mellitus, West Bank (2008).

22. Kitzler TM., *et al*. "Evaluation of treatment adherence in type 1 diabetes: a novel approach". *European Journal of Clinical Investigation* 37 (2007): 207-213.

23. Genuth S. "Insights from the diabetes control and complications trial/epidemiology of diabetes interventions and complications study on the use of intensive glycemic treatment to reduce the risk of complications of type 1 diabetes". *Endocrine Practice* 12 (2006): 34-41.

24. Murphy., *et al*. "Psycho-educational interventions for children and young people with Type 1 diabetes". *Diabetic Medicine* 23 (2006): 935-943.

25. King H., *et al*. "Global burden of diabetes 1995-2025. Prevalence, Numerical estimates and Projection". *Diabetes Care* 21 (2002): 1414-1431.

26. American Diabetes Association. Standards of medical care in diabetes. *Diabetes Care* 31 (2008): S12–S54.

Volume 2 Issue 12 December 2018