Knowledge Of Families Toward Type 1 Diabetes Among Children In AL-Diwaniyah City, Iraq: Cross-Sectional Study –College of Medicine/ University Of AL-Qadisiyah

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Abstracts: Background: Type 1 diabetes is one of the most common chronic diseases in childhood, that is considered a challenge for parents especially when the child is not developmentally able to manage the disease independently. Since optimal glycemic control is required to prevent acute and long-term diabetes-related complications and enhance school performance, the importance of involving adults in the child diabetes management is essential. Aim of the study: The current study aimed to evaluate the knowledge, regarding children with T1DM among families living in Diwaniyah city. Subjects and Method: A cross sectional study conducted in Al Diwaniyah governate, Iraq on a sample of 400 caregivers of type 1 diabetes mellitus diagnosed children for a period of three months. Structured questionnaires were used for Knowledge. Chi -square test was applied to find the significant association between qualitative variables. Independent t test and one way ANOVA were applied to illustrate a significant difference between quantitative variable. In all Statistical analyses, a p value equal or below 5% was considered significant. Results: Majority of caregivers; 192 (48%), were in their forties and married. Mothers 239 (59.8%) were the main caregivers, more than half of the studied sample 237(59.3%) had university or institute educational attainment. The average score for knowledge was 9.39±2.9 scores ranging from 0-12 score. Poor knowledge was found among 64 (16%) of caregivers, while 42(10.5%) and 294(73.5%) scored moderate and good knowledge respectively. Education and urban residency were significantly associated with good knowledge. Lower HbA1C level was seen associated with good diabetes knowledge. Conclusion: Although good knowledge were reported. Such discrepancy requires an increase in public awareness about the T1DM. Using modern technology to disseminate the correct information to caregivers.

Keywords: Knowledge, Caregivers, T1DM, Children.

1. INTRODUCTION

diabetes type 1 (T1D) is an auto-immune illness considered a common chronic condition in children. It is characterized by the beta cells damage in the pancreas, which leads to the inability of these cells to synthesize insulin hormone, (1). T1D is an intricate, demanding, and insulin-dependent condition that need regular blood glucose monitoring, carbohydrate intake control, and insulin administration to maintain optimal glycemic control. Maintaining ideal glycemic control is essential for the avoidance of both short-term and long-term diabetes-related issues, as well as for enhanced academic performance .[(2),(3),(4),(5),(6),(7)].

There are four distinct stages in the progression of the disease: pre-diabetes, diabetes, the honeymoon period, and complications. In the pre-diabetes stage, there is a gradual decline in insulin secretion caused by the destruction of beta cells by autoantibodies (8). Children with diabetes during this stage often have elevated levels of autoantibodies targeting cell antigens, It is the pre-symptomatic stage that is observed following some disruption in the pancreatic B cells, as a result of which the patient will start to exhibit diabetes symptoms over time (8).

In the diabetes stage, indications might assortment as of poly-uria, poly-dipsia, poly-phagia, defeat of weight, or weight increase.

The honeymoon phase is a brief period of remission that may occur if the child is not diagnosed at this time.

Insulin treatment is required for the rest of a T1DM patient's life, typically with multiple daily injections and dosage adjustments based on self-monitored blood glucose levels (9). Long-term management of T1DM requires a

multidisciplinary approach involving healthcare professionals such as physicians, dietitians, nurses, and particular consultants.

Diabetes education plays a significant role in enhancing knowledge, related to diabetes management (10). Regular follow-up visits with healthcare professionals are essential for assessing changes in diabetes status, identifying challenges with glucose monitoring and insulin administration, and addressing any concurrent medical conditions [(11) (12).].

2. PARTICIPANTS AND METHODS

This was a cross sectional study conducted in Al Diwaniyah governorate, Iraq on a convenient sample of caregivers of type 1 diabetes mellitus diagnosed children for a period from march to july 2023. Final sample size of the current study was 400 caregivers in order to reduce the effect of chance factors and to ensure better representation of target population and generalizability of the results. All caregivers of children, between the age of 3-17 years old, diagnosed with type 1 DM, presented during the period of study in the following settings were considered eligible:

1. Disease center for diabetes and endocrinology - Al Diwaniyah Health directorate. It represents the central facility in the governorate where patients diagnosed with diabetes receive their insulin treatment.
2. Maternity and Children Teaching Hospital in Al Diwaniyah. Contact details of diagnosed children were retrieved and caregivers were called and interviewed.
3. Online questionnaire: the questionnaire was provided online on a direct internet link, that allowed a fast click check and record of data, it was also readily available for use.

Children younger than 3 years of age or older than 17 years and Children of medical-profession parents were excluded from the study. A pilot study was conducted on a sample of 40 caregivers of T1DM children in Maternity and Children Teaching Hospital in Al Diwaniyah. Interviews were made directly after obtaining verbal consent and explaining briefly the study aim and objectives. According to the result of the pilot study, time required to complete the interview was noted and some questions were re-formed, correction of Arabic translation was also made for better understanding. All data collected in the pilot study were discarded and were never included among the data collection and analysis.

A structured questionnaire was adapted from previous validated published questionnaire, that was translated by researcher and revised by the supervisor (13) .

The questionnaire included three parts, Part one: Demographical characteristic of the participant (the accompanying person to the child diagnosed with type 1 DM), this part included questions regarding age (<25, 26-29, 30-35, 36-39, and ≥ 40 years). Relation to the child, occupation, residency, level of education, marital status (single, married, widowed, divorced or separated) and family size. Part two, demographical characteristic of the child with type 1 DM. this part included child's age, gender, duration of disease (≤1 year, 2-5 years, ≥6 years), family history of type 1 DM, Insulin regimen (≤2 times a day, or ≥3 times a day), recent HbA1C and Part three for the Knowledge questions. This part included 12 Diabetic knowledge questions.

Each question was scaled on a 3- point Likert scale, in such a way that "yes" were appointed a score of 1, while answers with "no" or "not sure" were appointed a score of 0.

Scores were summed and total knowledge was calculated. Participants were considered to have poor knowledge with respect to type 1 DM when they have a score of less than 60% of the total scores (14,15).

Thus, for the knowledge questions, the total scores ranged from 0-12. A score between 0 - <7 considered poor knowledge, while 7-<9 was considered moderate knowledge, and those with 9-12 scores were considered with good type 1 DM knowledge.

Permission has been taken from the Iraqi Ministry of Higher Education, and from the Community and Family Medicine Department in Collage of Medicine –Al Qadisiya University

Approvals were obtained from the ethical committee of ministry of health. Verbal consents were obtained from the caregiver after explaining the main aim and objectives of the study. All questionnaire-

forms were kept anonymous, no divulge of information had ever occurred. The Statistical Package for the Social Sciences (SPSS) version 22 was used for analysis, all collected data were recorded initially on an excel sheet, refined and coded then transferred to a SPSS. Categorical data were presented in frequency and percentages, while continuous variables were summarized in means and standard deviations.

Knowledge were categorized accordingly and Chi -square test was applied to find the significant association between qualitative variables (age, the caregiver, education, occupation, marital status, residency, gender of the child, disease duration, Family history of type 1 DM, and insulin regimen)

Independent t test and one way ANOVA were applied to illustrate a significant difference between quantitative variable (child age, HbA1c level). In all Statistical analyses, a p value equal or below 5% was considered significant.

3. RESULTS

A total of 400 caregivers of T1DM children were interviewed and included in the research. Majority of caregivers; 192 (48%), were in their forties or above, figure (1) depicts the distribution of the studied sample according to age.

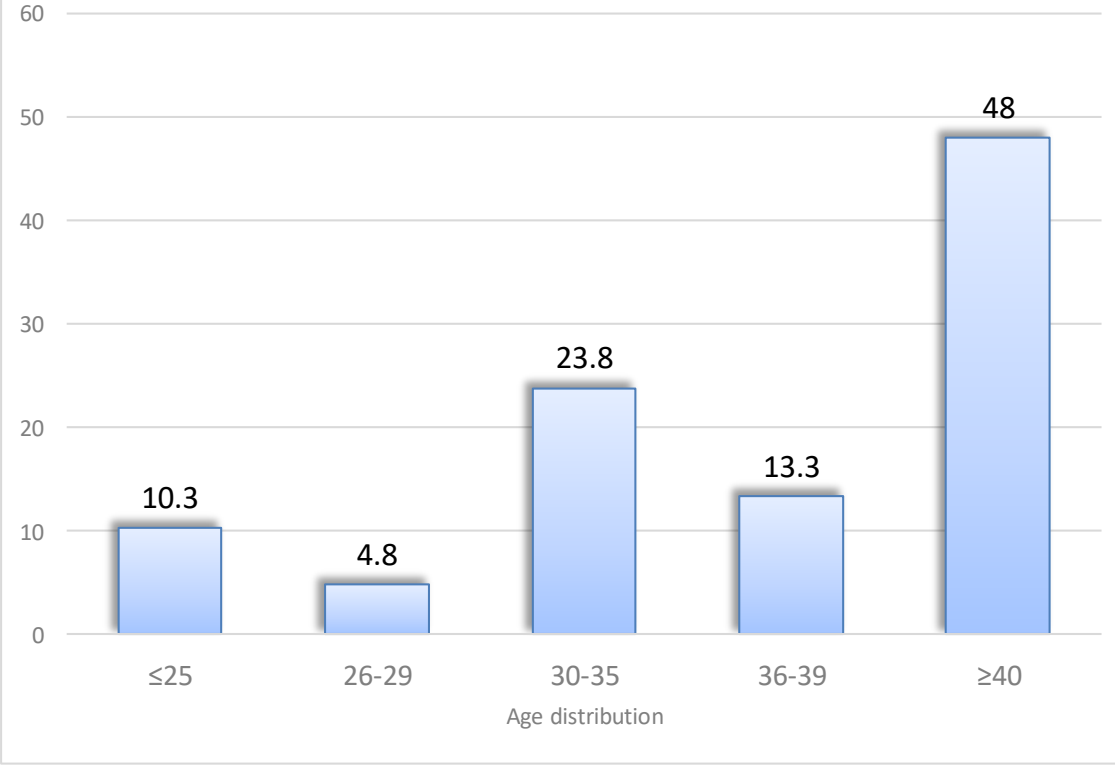

Figure (1) The distribution of the studied sample according to age.

Majority of the sample were married 317(79.3%), single, divorced or separate, and widowed were reported by 64(16%), 8 (2%), and 11(2.8%) respectively. Table (4.1) illustrates the distribution of studied sample by demographic variables. Mothers 239 (59.8%) were the main caregivers followed by fathers 116(29%).

More than half of the studied sample 237(59.3%) had university or institute educational attainment, secondary and primary school graduates constituted 57(14.3%) each. Around 49 (12.3%) of caregivers reported that they were illiterate.

Majority of caregivers were unemployed or housewives 191 (47.8%), employed caregivers and freelancer were seen among 158(39.5%) and 32(8%) respectively. Only 9 of the caregivers were students (2.3%). Around half of the sample 213(53.3%) lived in urban settings, while 187(46.8%) were from rural areas.

Table (4.1) The demographic variables of caregivers.

Demographic variables of caregivers.		Frequency	Percentage
The caregiver	Mother	239	59.8
	Father	116	29.0
	Sibling	4	1.0
	Grandparent	14	3.5
	uncle, or aunt	21	5.3
	Others	6	1.5
Occupation	housewife, unemployed	191	47.8
	Employed	158	39.5
	Worker	32	8.0
	Retired	10	2.5
	Student	9	2.3
Education	Illiterate	49	12.3
	Primary	52	13.0
	Secondary	62	15.5
	University or higher	237	59.3
Marital status	Single	64	16.0
	Married	317	79.3
	divorced separated	8	2.0
	Widowed	11	2.8
Residency	Urban	213	53.3
	Rural	187	46.8
Total		400	100

Table (4.2) demonstrates the demographic characteristics of the children with T1DM. The average age of children was 9.19±3.4 years ranging from 3-17 years of age. The average HbA1C was 8.60±2.1 mmol/L ranging from 5-14 mmol/L

Half of T1DM 212 (53%) were males, and 188 (47%) were females. Around 168 (42%) of children had the disease for one year or less. Majority 329(82.3%) had no family history of T1DM, and 262 (65.5%) used insulin regimen of ≤3 times per day

Table (4.2) The demographic characteristics of the children with T1DM.

Demographic variables of T1DM children		**Frequency**	**Percentage**
Child age (M±SD) Range	9.19±3.4 (3-17)		
HbA1C (M±SD) Range	8.60±2.1 (5-14)		
Gender	Male	212	53.0
	Female	188	47.0
Disease duration in years	≤1	168	42.0
	2-5	159	39.8
	≥6	73	18.3
Presence of T1DM in family	No	329	82.3
	Yes	71	17.8
Insulin regimen	≤2 times/day	138	34.5
	≤3 times/day	262	65.5
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Majority of caregivers knew that type 1 DM treated with insulin (79.5%), and that diabetes is a risk factor for other diseases (82%) and it increased the level of glucose in the blood (71.8%). Table (3) shows the responses of the studied sample to the knowledge questions.

Table (3) Responses of the studied sample to the knowledge questions.

The knowledge questions	Yes	No	Not sure
Is T1DM treated with insulin?	318(79.5%)	34(8.5%)	48(12%)
Does diabetes increase glucose in blood?	287(71.8%)	44(11%)	69(17.3%)
Is diabetes increase the risk of other disease?	328(82%)	31(7.8%)	41(10.3%)
Dose T1DM leads to polyuria in diabetic patient?	353(88.3%)	18(4.5%)	29(7.3%)
Does T1DM lead to loss of weight in diabetic patient ?	290(72.5%)	57(14.3%)	53(13.3%)
Does T1DM lead to fatigue and lack of concentration in diabetic patient	310(77.5%)	15(3.8%)	75(18.8%)
Do you think the normal range of pre-prandial blood sugar is (90-130)?	278(69.5%)	63(15.8%)	59(14.8%)
Do you think normal reading of HbA1C is <=7.5	240(60%)	72(18%)	88(22%)
Are tremors and sweating mean hypoglycemia in diabetic patient?	346(86.5%)	21(5.3%)	33(8.3%)
Do you inject insulin in to abdomen, thigh, gluteus or deltoid?	368(92%)	15(3.8%)	17(4.3%)
Do you inject insulin in different sites?	300(75%)	75(18.8%)	25(6.3%)
Does diabetes mellitus delay wound healing?	340(85%)	29(7.3%)	31(7.8%)

The average score for knowledge was 9.39±2.9 scores ranging from 0-12 score. Figure (4.2) illustrates the distribution of caregivers by their knowledge scores. Poor knowledge was found among 64 (16%) of caregivers, while 42(10.5%) and 294(73.5%) scored moderate and good knowledge respectively.

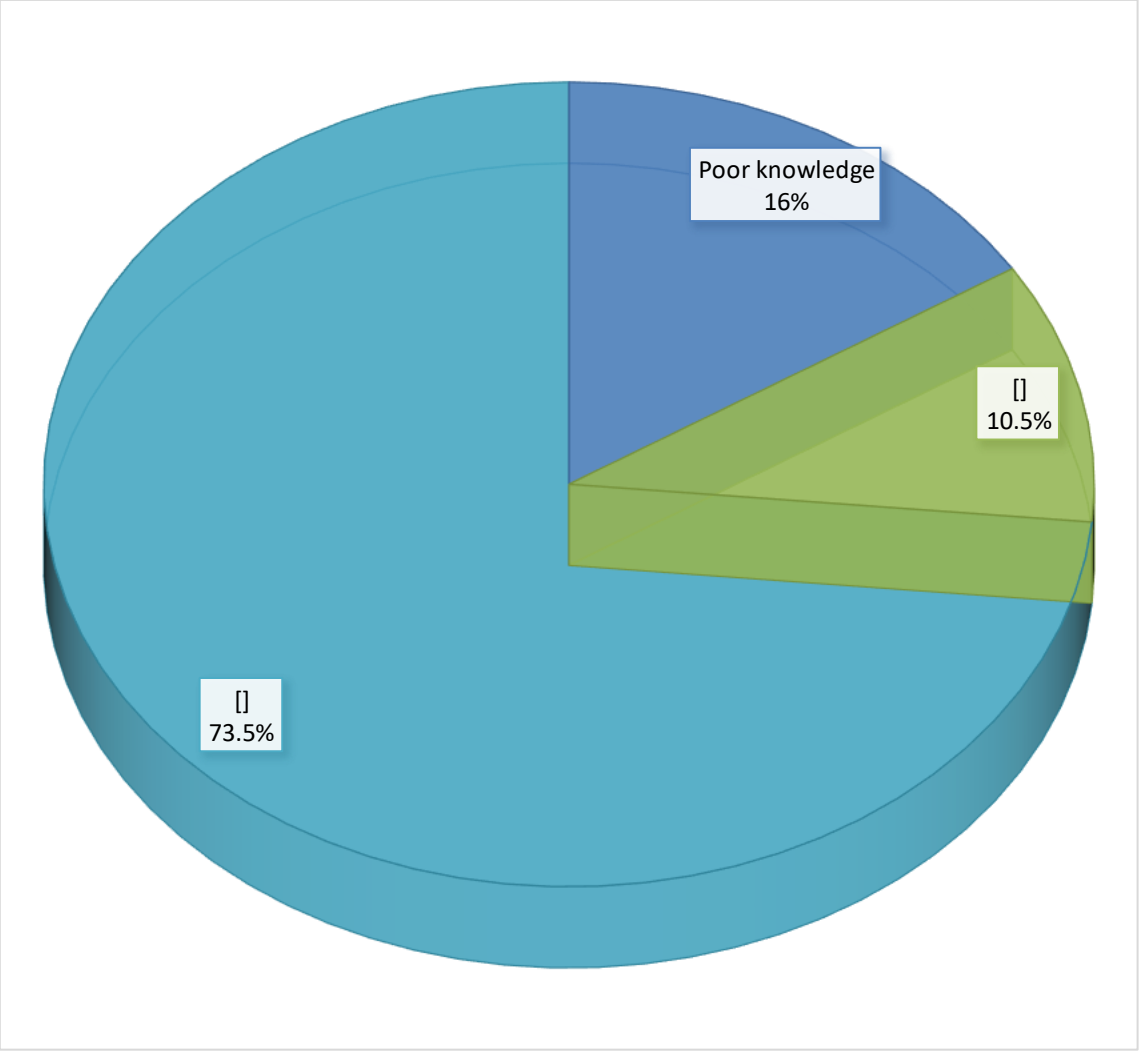

Figure (4.2) The distribution of caregivers by their knowledge scores.

Table (4) illustrates the association of demographic characteristics of caregivers and knowledge. Education was significantly associated with good knowledge 78.1% of university graduate had good diabetes knowledge score (P value= 0.006). Residency showed a significant association with knowledge, those living in urban setting had good knowledge scores (p value =0.004).

Table (4) The distribution of the sample knowledge score by demographic characteristics of caregivers.

Variables		Poor knowledge	moderate knowledge	good knowledge	P value
Age of caregiver	≤25	5(12.2%)	6(14.6%)	30(73.2%)	0.762
	26-29	4(21.1%)	2(10.5%)	13(68.4%)	
	30-35	18(18.9%)	6(6.3%)	71(74.7%)	
	36-39	8(15.1%)	4(7.4%)	41(77.4%)	
	≥40	29(15.1%)	24(12.5%)	139(72.4%)	
The caregiver	Mother	37(15.5%)	23(9.6%)	179(74.9%)	0.486
	Father	18(15.5%)	14(12.1%)	84(72.4%)	
	Sibling	0	0	4(100.0%)	
	grandparent	3(21.4%)	1(7.1%)	10(71.4%)	
	uncle, or aunt	3(14.3%)	4(19.0%)	14(66.7%)	
	Others	3(50.0%)	0	3(50.0%)	
Occupation	Housewife	38(19.9%)	19(9.9%)	134(70.2%)	0.391

	employed	21(13.3%)	16(10.1%)	121(76.6%)	
	Worker	4(12.5%)	5(15.6%)	23(71.9%)	
	Retired	1(10.0%)	0	9(90.0%)	
	Student	0	2(22.2%)	7(77.8%)	
Education	illiterate	16(32.7%)	5(10.2%)	28(57.1%)	**0.006***
	Primary	12(23.1%)	3(5.8%)	37(71.2%)	
	Secondary	9(14.5%)	9(14.5%)	44(71.0%)	
	University	**27(11.4%)**	**25(10.5%)**	**185(78.1%)**	
Marital status	Single	6(9.4%)	8(12.5%)	50(78.1%)	0.069
	Married	53(16.7%)	29(9.1%)	235(74.1%)	
	divorced	3(37.5%)	2(25.0%)	3(37.5%)	
	widowed	2(18.2%)	3(27.3%)	6(54.5%)	
Residency	**Urban**	**22(10.3%)**	**24(11.3%)**	**167(78.4%)**	**0.004***
	Rural	42(22.5%)	18(9.6%)	127(67.9%)	

* Chi Square test

Table (5) shows the distribution of the sample knowledge score by demographic characteristics of T1DM children.

HbA1C showed a significant difference according to knowledge score, lower HbA1C was seen associated with good diabetes knowledge (p value = 0.013)

Table (4.5) The distribution of the sample knowledge score by demographic characteristics of T1DM children

Variables		**Poor knowledge**	**moderate knowledge**	**good knowledge**	**P value**
Child age (M±SD)		8.31±3.4	9.67±3.9	9.31±3.3	0.067*
HbA1C (M±SD)		**9.06±2.2**	**9.20±2.3**	**8.42±2.0**	**0.013***
Gender	Male	36(17.0%)	20(9.4%)	156(73.6%)	0.684
	Female	28(14.9%)	22(11.7%)	138(73.4%)	
Disease duration in years	≤1	25(14.9%)	16(9.5%)	127(75.6%)	0.157
	2-5	25(15.7%)	13(8.2%)	121(76.1%)	
	≥6	14(19.2%)	13(17.8%)	46(63.0%)	
T1DM in family	No	58(17.6%)	35(10.6%)	236(71.7%)	0.143
	Yes	6(8.5%)	7(9.9%)	58(81.7%)	
Insulin regimen	≤2 /day	19(13.8%)	21(15.2%)	98(71.0%)	0.071
	≤3 /day	45(17.2%)	21(8.0%)	196(74.8%)	

*one way ANOVA.

DISCUSSION

Type 1 diabetes remains the most common chronic disease in childhood. It is an insulin-dependent, complex, and demanding disease that requires frequent blood glucose monitoring, management of carbohydrate intake, and insulin administration to achieve optimal glycemic control The correct knowledge can affect the involved children and even enhance the quality of their life. (16) The incidence and prevalence rates for type 1 diabetes in the young appear to be gradually rising in most countries in the world, with the increases being most marked in the very young and in those countries experiencing rapid economic growth. (17)

In the current study, around 48% of caregivers were in their forties, which agrees with results reported by Iken M et al, where 65% of parents belonged to the age group of 40 -49 years (16)

Also, our current result is in alignment with outcomes published by Mohammad F et al 2020 in Egypt, where 56% of caregivers were around 40 years old. (18).

Mothers (59.8%) were t3he main caregivers followed by fathers. This finding is aligned with conclusions reported by Iken M et al 2023, and Mohammad F et al 2020 where 89% and 92% of the cases, the mother was the main caregiver and the one that filled out the questionnaire (16), (18)

More than half of the studied sample (59.3%) had university or institute educational attainment, secondary and primary school graduates constituted (14.3%) each.

This finding was in accordance with results reported by Iken M et al 2023 in Denmark, where 75% had completed a higher education (16) along the same lines, only 12.3% of caregivers were illiterates which is in accordance with Mohammad F et al 2020 Egypt where only 10% were illiterates. (Mohammad F et al 2020).

Only 39.5% of caregivers were employed, which disagrees with Iken M et al 2023 where around 88% were employed. (16) This difference can be inherited in the community standards and culture from one side, and the availability of jobs in the market.

In our study, around half of the children were males (53%), which agrees with Mohammad F et al 2020 in Egypt, 56% of studied children were males. (18)

Yet, this disagrees with Meshki R et al 2022, where males constituted 75% of the sample. (Meshki R et al 2022) A difference that can be related to sampling technique.

Around 17.7% of the sample had a family history of type 1 DM. which is a bit lower to the findings reported by Meshki R et al 2022, where about 25% of patients had a history of diabetes in the family. (19)

Also, lower than results reported by Parkkola A et al where a total of 12.2% of the subjects had a first-degree relative with type 1 diabetes (father 6.2%, mother 3.2%, and sibling 4.8%) and 11.9% had an affected second-degree relative (20)

The average score for knowledge was 9.39±2.9 scores ranging from 0-12 score. The current study showed a high level of diabetic knowledge among the caregivers, 73.5%, 10.5%, and 16% of caregivers had good, moderate and poor diabetic knowledge respectively.

Our results agree with that produced by Al-Hussaini M and Mustafa S. 2016 in Kuwait, where the percentage of diabetic knowledge ranged from 71 – 72.3% (21) This might be explained by the fact that majority of the sample (87.9%) had at least 6 years of education.

Yet, the diabetic knowledge level reported in the current study was higher than findings published by Aldekhayel G study in Saudi Arabia, where 57.2% of the sample were knowledgeable about diabetes. (22)

Also, the current diabetic knowledge was higher than that reported by Mohammad F et al 2020 in Egypt, where 45.4% of caregivers had sufficient general knowledge regarding diabetes, (18)

and higher than the knowledge level state in a study by Meshki R et al 2022 in Iran where only 35% of patients had good diabetic knowledge (19)

These differences can be related to the educational level of the selected sample from one hand, and to the level of diabetic awareness in the community from the other. Another point that can be elicited here is the efforts of health authorities in disseminating diabetic health education in the society.

Education was significantly associated with good knowledge, 78.1% of university graduate had good diabetes knowledge score (P value= 0.006). Which is in alignment with results reported by Gautam A et al in Nepal, where the likelihood of having a level of highly sufficient knowledge was 17 times higher among patients who have graduated and have above level of education compared to those who were illiterate. (23).

The current finding was also in accordance with results reported by Meshki R et al in Iran, where education level was significantly associated with improved knowledge. ($P < 0.05$). (19)

Interestingly, HbA1C showed a significant difference according to knowledge score, lower levels of HbA1C; i.e. better glycemic control, was significantly associated with good diabetes knowledge (p value = 0.013).

Education is empowerment and knowledge; especially among caregivers of type 1 DM children, is a crucial factor in maintaining those children glycemic control, monitor and adherence to treatment. However, poor glycemic control, insufficient treatment adherence and severe psychological adjustment to disease could result from inaccurate or lack of knowledge about diabetes (24).

It had been reported that poor control of glycated hemoglobin affects the quality of life for those children (25)

in a similar vein, urban residency showed a significant association with knowledge, those living in urban setting had good knowledge scores (p value =0.004).

The current results agree with that mentioned by Akter F et al study 2022 in Bangladesh, where respondents from semi-urban areas and urban areas were more likely to have good knowledge than those living in rural areas. (26)

This might be explained by the readily access to health facility privilege in urban settings, in addition to more empowerment and media exposure that can contribute in increasing the knowledge of caregivers regarding the disease of their children. Even influence further monitoring or seeks ways to enhance the quality of life for their children, like for example using the currently available diabetes Insulin Pumps.

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