Knowledge and Attitude of Primary School Teachers Regarding Diabetic Students at Assuit City

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Abstract:

Background: Type 1 diabetes mellitus (T1DM) is one of the most frequent childhood chronic disorders. Teachers' awareness regarding diabetes and its complications could save students' lives. **Aim of the study:** To assess primary school teachers' knowledge and attitude regarding diabetic students. **Research design:** A cross-sectional design was used. **Sample:** A multistage sampling procedure was applied. A total number of 400 teachers was recruited for the study. **Setting:** This study was conducted in primary schools at Assuit City. **Tools:** An interviewer-administered questionnaire was used. It inquired about personal characteristics, knowledge about T1DM, and teachers' attitude toward T1DM. **Results:** Only 15% of the studied participants had a good level of knowledge about T1DM, while 64.8% had a positive attitude regarding T1DM. The adjusted significant predictors for increased knowledge about T1DM were being a diabetic patient, having diabetic students in their classes, receiving a previous training on T1DM, and having high scores of positive attitude of T1DM. Similarly, increasing knowledge level about T1DM significantly predicts a high positive attitude of T1DM. **Conclusion:** A low level of knowledge about T1DM was detected among primary school teachers despite a large proportion having a positive attitude toward T1DM. **Recommendations:** To improve teachers' knowledge about T1DM, it's recommended to integrate them into health education programs on T1DM before employment and in a regular manner.

Keywords: Attitude, Diabetic student, Knowledge & Primary school teachers.

Introduction

Diabetes is a rapidly growing health problem globally. In 2019, the International Diabetes Federation (IDF) estimates that Egypt is the 9th country worldwide with about 8,850,400 cases and a prevalence of 15.2% in adults. By 2045, Egypt is expected to be the 7th country worldwide **(Azzam et al., 2021)**.

Type 1 diabetes (T1DM) is called insulin-dependent diabetes and it might occur at any age but commonly affect children and young people. This type forms about 5%–10% of all cases of diabetes. In type 1 diabetes, the pancreas does not release any insulin due to the cellular destruction of beta cells **(Mobasseri et al., 2020)**.

In Egypt, the prevalence rate of T1DM among school children in the Heliopolis and El Manyal districts was 1.09/ 1000 and 1.12/1000 school children respectively **(Kamaleldeen et al., 2018)**.

There are many risk factors for the development of diabetes including; obesity, eating behavior, physical activity and socioeconomic factors **(Almehmad et al., 2018)**.

Diabetes mellitus presents with three typical signs including; excessive urination (polyuria), increase thirst (polydipsia), and increased hunger (polyphagia). Other symptoms include increase blood sugar level (hyperglycemia), sugar in urine (glycosuria), frequent itching around the genitals, dry mouth, weight loss without reason, fatigue, blurred vision, headache, and loss of consciousness **(Muoki Francis et al., 2017)**.

Hypoglycemia and hyperglycemia is the commonest acute complication of T1DM, hypoglycemia is defined as a low blood glucose level less than 70 mg/dL, which considered as medical emergency requiring prompt recognition and treatment to prevent organ and brain damage. Hyperglycemia was considered for random blood glucose values >126mg/dL (7.0mmol/L). **(Abdulrahman, 2022** & **Thomas et al., 2019)**.

Diabetes can be controlled by changing diet, doing physical exercise, maintaining reasonable body weight, monitoring lipid profile, and having appropriate medication when necessary **(Alam et al., 2021)**.

Diabetic students spend most of their time in schools away from their families. T1DM is a disease that necessitates frequent monitoring and close-up management to avoid its complication. It's mandatory for school teachers to have the knowledge and attitude to correctly respond when a complication occurs **(Abdulrahman, 2022)**.

Poorly controlled diabetes might lead to prolonged absence from school that negatively affect children

academic achievement. To enhance normal school experience for diabetic students it is essential for such children to participate in all activities with few restrictions in order to facilitate a normal school experience. They should have the same access to educational opportunities as their peers, and not be excluded from extracurricular events or field trips **(Chopra et al., 2017)**.

Moreover , diabetic students are at greater risk for emotional outbursts and behavioral disorders that might hinder academic performance **(Aljefree et al., 2023)**.

A Saudi cross-sectional study conducted among Taif primary school teachers, reported that two fifth of studied teachers had good knowledge and only 10% had positive attitude toward T1DM **(Alzaidi et al., 2020)** .

A Greece cross-sectional study was conducted among primary school's teachers in the Attica region of Greece. It found that only 3, 2% of teachers had sufficient knowledge. Generally, teachers had favorable attitudes towards T1DM in school **(Statiri et al., 2022)**.

Up to our knowledge, there is no previous Egyptian study has explored the knowledge, and attitude of primary school teachers regarding type 1 diabetic student.

Finally, school nurses play a crucial role in health promotion and care for students with chronic diseases. Besides healthcare activities, the provision of health education for the child, family, school staff, and classmates might help them cope with the illness and improve support at school **(Nombela-Franco et al., 2022)**.

Significance of the study:
T1DM is one of the most frequent childhood illness, affecting nearly 150 million children globally**.** T1DM affect 8 out of 100,000 Egyptian children under the age of 14 **(Magdy etal., 2022).**

The diabetic students spend nearly one-third of their day in the school, the teachers can assist in diabetes management. For effective assistance of teachers in diabetic management, they should have a good knowledge about diabetes as signs and symptoms and proper management of any complication (**Alotaibi, et al., 2021)**.

Aim of the Study:
The current study aimed to:
Assess primary school teacher's knowledge and attitude regarding type 1 diabetic students.

Research question:
What is level of knowledge and attitude and their predictors among primary school teachers regarding T1DM?

Subject and Method
Research design:
A cross-sectional design was applied.
Setting:
The study was conducted in primary schools at Assiut City.
Sample:
Sample size was calculated using Epi info (ver. 7). The used parameters to estimate the minimum required sample size include a prevalence of acceptable level of knowledge about diabetes 47.6 % **(Wright, 2016)**, a margin of error of 5%, and 95% confidence interval. The minimum required sample was 383 teachers, ten percent was added to compensate for dropouts and refusals. A total number of 400 teachers was recruited for the study.

Sample technique:
The total number of primary schools in Assiut city was (70) schools 36 east and 34 wests. A multistage sampling procedure was applied for the recruitment of the studied population. First stage: systematic random sample method was used to choose the schools, first school choose randomly and then every seventh school chosen as follows 3rd, 10th, 17th, ………., 70th. The numbers of selected schools were (10) schools. Second stage: simple random sample was used for requirement of needed teachers in each school.

Tools of data collection: An interviewer administered questionnaire was used based on the relevant literature. It is consisting of three tools

Tool 1:personal characteristics such as age, sex, marital status, residence, years of experience, presence of diabetic students in class, and receiving previous training on the management of T1DM **(Abdulrahman, 2022 &Wright, 2016).**

Tool 2: Knowledge of teachers about type 1 diabetes
It included eleven questions with correct, incorrect, and don't know options it inquired on the correct range of blood sugar, the nature of TIDM, the usual affecting of schools student with TIDM, signs and symptoms of DM as polyuria, polydipsia, extreme hunger, fatigue, lack of concentration and loss of weight in diabetic student, usage of insulin for TIDM in treatment, the possibility of a diabetic student to practice sports at school, and diabetic student should take sweets or juices before physical activities class **(Alzaidi et al., 2020 & American Diabetes Association, 2017).**

The scoring system of knowledge:
The total score was calculated for each participant. A percent for the summed score was calculated (score $\div 11 \times 100$). A grade was given for correct answers and zero was given for incorrect and don't know answers. Each item is summed up and then converted into a

percent. Teachers' knowledge was classified into poor level of knowledge = <50% (1:5) grade, fair level of knowledge= 50% to 75% (6:8) grade, and good knowledge =more than 75% (9:11) grade **(Mustafa et al., 2022).**

Tool 3: The attitude of the studied teachers toward type 1 diabetes

It included the teachers' attitude toward T1DM which contained of six statements. The response to the statements measured based on 3 points Likert scale (agree, uncertain and disagree) were ranged from 3 to 1 respectively. The attitude questions inquired on negative impact of diabetes on learning capabilities/ academic performance, physical capabilities, and on other capabilities as hobbies, treating diabetic students in similar manner as their peers, willing to have diabetic children in teacher's class, and role of teachers in educating students about T1DM **(Chopra etal., 2017).**

Scoring system of Attitude:

The total score ranged from 6 to 18 grade, positive attitude was described if the participant had a score higher or equal to median ($\geq$ 14), while a negative attitude was described to those who had a score low than the median (< 14).

Methodology:

Face validity:

Face validity was done by five specialists who evaluated the tools for clarity, relevance, comprehensiveness, and understanding, including three in community health nursing, one in medical surgical nursing, and one in community medicine, at Assiut University.

Reliability: and internal consistency for the used questionnaire were calculated and the values of Cronbach's Alpha reliability were as follows 0.852 for knowledge and 0.736 for attitude toward T1DM**.**

Pilot study:

Pilot study was carried out before starting data collection on 10% of total calculated sample (40 cases). The time of pilot study collected in October 2022, the aim of this study was to test the clarity of tools and estimate the required time to fill the questionnaire. Based on the result of a pilot study no modification in the tool was done, so that it included in the study.

Data collection phase (fieldwork):

Data collection started from October 2022 to December, 2022; two days/ week for the studied teachers, and approximately from 15-20 questionnaires were collected daily from 8 A.M to 2 P.M. Filling of the questionnaire was taken from 15-20 minutes. Written consent was obtained from all the studied teachers before the study enrollments, and after that a detailed explanation for the study objectives was done.

Ethical considerations:

Research proposal was approved from the Ethical Committee in the Faculty of Nursing-Assuit University. In the study obtaining written informed consent, ensuring confidentiality of participant and have the right to refuse to participate and or withdraw from the study without any rationale at any time.

Statistical Design:

Statistical Package for Social Science (SPSS) version 26 was used for data entry and analysis. quantitative data was expressed in form of mean and standard error, while qualitative data was expressed in form of frequencies and percentage. The univariate and multivariate linear regression were used in models in predicting higher level of knowledge and positive attitude score. The P-value is considered statistically significant when less than 0.05 (P < 0.05).

Results

Table (1): Socio demographic characteristics of primary school teachers at Assuit City, 2022(n=400).

Item	No. (400)	%
Age: (years)		
< 40	101	25.3
≥ 40	299	74.7
Mean ± SD (Range)	45.93±8.119(23:69)	
Gender:		
Male	57	14.3
Female	343	85.7
Marital status:		
Single	16	4.0
Married	356	89.0
Divorced	6	1.5
Widow	22	5.5
Place of Residence:		
Rural	4	1.0
Urban	396	99.0
Years of experience:		
< 10	41	10.3
≥ 10	359	89.7
Mean ± SD (Range)	1.8975±.30368(1:45)	
Do you have diabetes?		
Yes	63	15.7
No	337	84.3
Have positive history with diabetes.		
Yes	244	61.0
No	156	39.0
Have diabetic students in class.		
Yes	139	34.7
No or don't know	261	65.3
Receiving a previous training about type 1 diabetes		
Yes	30	7.5
No	370	92.5

Table (2): Distribution of primary school teachers by Knowledge about type 1 diabetes at Assuit City, 2022(n=400).

Variables	No. (400)	%
Normal range for blood sugar:		
Correct answer	47	11.8
Incorrect answer	353	88.2
Nature of DM		
Correct answer	225	56.3
Incorrect answer	175	43.7
School children are usually affected by Type 1 DM		
Correct answer	144	36.0
Incorrect answer	256	64.0
DM leads to polyuria in diabetic student		
Correct answer	350	87.5
Incorrect answer	50	12.5

Variables	No. (400)	%
DM leads to polydipsia in diabetic student		
Correct answer	280	70.0
Incorrect answer	120	30.0
DM leads to extreme hunger in diabetic student:		
Correct answer	262	65.5
Incorrect answer	138	34.5
DM leads to fatigue and lack of concentration in diabetic student		
Correct answer	278	69.5
Incorrect answer	122	30.5
DM leads to loss of weight in diabetic student		
Correct answer	215	53.7
Incorrect answer	185	46.3
Type 1 DM is treated with insulin		
Correct answer	132	33.0
Incorrect answer	268	67.0
The diabetic student can do sports at school		
Correct answer	219	54.7
Incorrect answer	181	45.3
The diabetic student should take sweets or juices before physical activities class		
Correct answer	226	56.5
Incorrect answer	174	43.5
Total score of basic knowledge about diabetes	5.96 ± 0.12 (0.00: 1.00)	
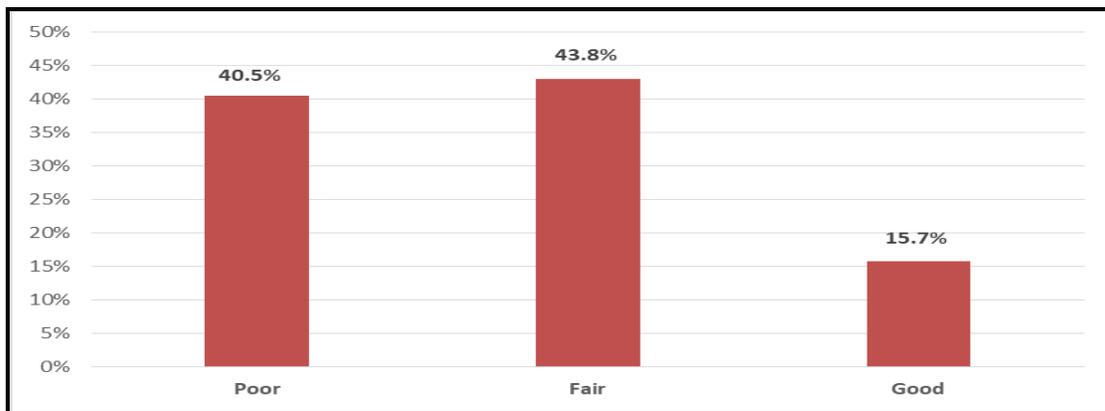
Figures (1): Total score of studied teachers' knowledge regarding type 1 diabetes at Assuit City, 2022(n=400).

Table (3): Distribution of primary school teachers' attitude regarding T1DM at Assuit City, 2022(n=400).

| Variables	Agree		Uncertain		Disagree	
	No.	%	No.	%	No.	%
Diabetes affects negatively on learning capabilities/ academic performance in such children.	216	54.0	100	25.0	84	21.0
Diabetes affects negatively on physical capabilities in such children.	298	74.5	58	14.5	44	11.0
Diabetes affects negatively on other capabilities in such children as hobbies.	181	45.3	87	21.8	132	33.0
Diabetic students should be treated the same as their peers.	164	41.0	45	11.3	191	47.7
willing to have diabetic children in class.	245	61.3	92	23.0	63	15.7
The teacher has a role in educating students about T1DM.	338	84.5	34	8.5	28	7.0
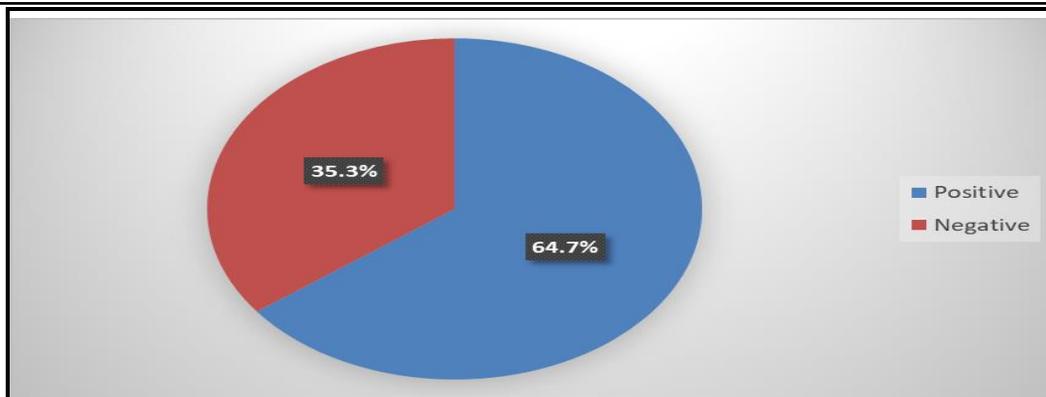
Figure (2): Total score of studied teachers 'attitude regarding type 1 diabetes at Assuit City, 2022(n=400).

Table (4): Predictors of knowledge about type 1 diabetes among primary school teachers at Assiut City

	Unadjusted regression				Adjusted regression			
	β±SE	95%CI		P value	β±SE	95%CI		P value
		Lower	Upper			Lower	Upper	
Age in years	0.046±0.282	-.0509-	0.600	0.872	-0.037±0.278	-.583-	0.509	0.895
Years of experience	0.346±0.404	-0.447-	1.140	0.391				
Gender (Female)	Reference group							
Male	0.494±0.350	-0.194-	1.181	0.159	0.197±0.346	-0.484-	0.877	0.571
Type of school (governmental)	Reference group							
Private	-0.373-±0.293	-0.949-	0.202	0.203				
Do you have diabetes (NO)	Reference group				Reference group			
Yes	0.857±0.334	0.201	1.513	**0.011**	0.671±0.335	0.012	1.329	**0.046**
Having a diabetic student in class (NO)	Reference group				Reference group			
Yes	0.801±0.254	0.301	1.301	**0.002**	0.723±0.250	0.230	1.215	**0.004**
Positive family history of diabetes (NO)	Reference group							
Yes	0.015±0. 251	-0.479-	0.509	0.953				
Receiving previous training (NO)	Reference group				Reference group			
Yes	1.681±0.458	0.782	2.581	**0.000**	1.558±.454	0.666	2.450	**0.001**
Diabetes Attitude score	0.120±050	0.021	0.218	**0.017**	0.108±0.049	0.011	0.204	**0.029**

Table (5): Predictors of attitude about diabetes among primary school teachers at Assiut City

	Unadjusted regression				Adjusted regression			
	β±SE	95%CI		P value	β±SE	95%CI		P value
		Lower	Upper			Lower	Upper	
Age in years	0.109±0.280	-0.442-	0.660	0.697	0.058±.279	-0.491-	0.606	0.836
Years of experience	-0.265-±0.401	-1.054-	0.524	0.510				
Gender (Female)	Reference group							
Male	0.711±.0347	0.029	1.393	**0.041**	0.650±0.348	-0.034-	1.333	**0.062**
Type of school (governmental)	Reference group							
Private	-0.373-±0.293	-0.949-	0.202	0.203				
Do you have diabetes (NO)	Reference group				Reference group			
Yes	0.608±0.333	-0.047-	1.262	**0.069**				
Having a diabetic student in class (NO)	Reference group				Reference group			
Yes	0.201±0.256	-0.301-	0.704	0.432				
Positive diabetes family history(NO)	Reference group							
Yes	0.042±0.250	-0.449-	0.533	0.168				
Receiving previous training (NO)	Reference group				Reference group			
Yes	-0.306-±0.462	-1.215-	0.603	0.508				
Diabetes basic knowledge score	0.118±0.049	0.021	0.215	**0.017**	0.112±0.050	0.014	0.209	**0.025**

Table (1): Shows socio-demographic data of primary school teachers at Assuit City. It was revealed that 74.8% of studied teachers aged more than 40 years or equal, the mean age was (45.93±8.119). Female teachers represented 85.7%. Regarding marital status 89% of the studied teachers were married and 99% urban residents. Also this table represent that 15.7% of studied teachers reported having diabetes mellitus, and 61.0 % had appositive family members of diabetes mellitus. 34.7% had diabetic students in their class. Only 7.5 % received training about the symptoms and treatment of T1DM.

Table (2): Illustrates the knowledge of primary school teachers about type 1 diabetes mellitus at Assuit City. It showed that 11.8 % of the studied teachers correctly identified the normal range for blood sugar. Also the table represents that 56.3 % correctly answered the nature of diabetes mellitus, and 36% know that school children are usually affected by T1DM. An acceptable proportion of studied teachers correctly answered the symptoms of diabetes mellitus, polyuria (87.5%), polydipsia (70%), extreme hunger (65.5%), fatigue and lack of concentration (69.5%), loss of weight in diabetic patients (53.7%), Moreover, 33.0% of studied teachers know that T I DM is treated with insulin, 54.7% know that diabetic student can do sports at school. 56.5% know that the diabetic student should take sweats or juices before physical activity class. The mean values of basic knowledge (5.96 ± 0.12).

Figure (1): Displays the total score of studied teachers' knowledge regarding type 1 diabetes at Assuit City. It presents that 40.5% of studied teachers had poor knowledge, and 43.8 % of them had fair knowledge, while, 15.7 % had good knowledge regarding type 1 diabetes.

Table (3): Display the attitude of primary school teachers at Assuit City toward type 1 diabetes. It was found that 54%, 75.5%, and 45,3% of studied teachers agreed that diabetes affects negatively on learning capabilities/ academic performance, physical capabilities in such children, and on other capabilities in such children, respectively. While 41% of studied teachers agreed that diabetic students should be treated the same as their peers. In addition, 61.3% were willing to have diabetic children in their classes. Finally, 84.5% agree that teachers had a role in educating students about DM.

Figure (2): Illustrate the total score of studied teachers' attitude regarding type 1 diabetes at Assuit City. It reveals that 64.7 % of the studied teachers had positive attitude toward type 1 diabetes, while 35.5% had negative attitude.

Table (4): Shows univariate and multivariate linear regression models for predicting knowledge increase level.

In unadjusted regression models, being adiabatic teachers and receiving previous training about diabetes significantly predict higher knowledge among primary school teachers (**β** 0.857, **95%CI** 0.201: 1.513), (**β** 1.681, **95%CI** 0.782: 2.581) respectively, similarly, teachers who have a diabetic student in their classes had significantly higher knowledge compared to those who don't have (**β** 0.801, **95%CI** 0.301: 1.301). Attitudes were positive predictors for higher knowledge levels (**β** 0.120, **95%CI** 0.021: 0.218).

In adjusted regression models being adiabatic teachers (**β** 0.671, **95%**CI 0.012: 1.329), receiving previous training about diabetes (**β** 1.558, **95%CI** 0.666: 2.450), having diabetic students (**β** 0.723, **95%CI** 0.230: 1.215), and increasing attitude scores (**β** 0.108, **95%CI** 0.011: 0.204) were significant predictors for improving knowledge scores.

Table (5): Shows univariate and multivariate linear regression models for predicting positive attitude.

In unadjusted regression models. The significant predictors for positive attitude regarding T1DM were being male (**β** 0.711, **95%CI** 0.029 :1.393), and having diabetes, (**β** 0.608, **95%CI** 1.262: 0.069).

In adjusted regression models increasing knowledge (**β** 0.112, **95%CI** 0.014 :0.209) and, being male (**β** 0.650, **95%CI** 1.333 :0.062) were significant predictors for improving diabetic attitude score.

Discussion

Knowledgeable trained teachers are necessary for type 1 diabetic student to avoid the immediate health risks of disease and to achieve good metabolic control required to minimize risks for late diabetes complications. Assessing the knowledge and attitude among teachers helped us to identify the gap in knowledge and its impact on attitude (**Mustafa et al., 2022**). The current study aimed to assess the knowledge and attitude of primary school teachers regarding type 1 diabetes.

As regard to age , the study revealed that nearly three quarter of the studied teachers aged more than 40 years or equal, the study result was supported by (**Mustafa et al., 2022**) who conducted a study in Baghdad about knowledge , attitude , and practice among primary school teachers toward diabetic emergencies and they mentioned that more than half of the participants aged above 40 years old.

According to gender more than four–fifth of the studied teachers were female. This result is opposed to (**Aldekhayel, 2020**) who conducted study in Riyadh , Kingdom of Saudi Arabia about assessment of diabetic knowelge , attitude and practice of school teachers in Riyadh , Kingdom of Saudi Arabia and who mentioned that female represent less than half of participants.

The present study showed that the majority of the studied teachers were married**.** The current study was similar to **(Wright, 2016)** who conducted study in Georgia about school personnel knowledge and perceived skills in diabetic emergencies in Georgia and who found that the majority of participants were married.

As regard to years of experience, the present study showed that the majority of the studied teachers had more than ten years of experience or equal , it is disagreed with **(Alotaibi. et al., 2021)** who conducted astudy in Riyadh Saudi Arabia about knoweldge about the symptoms of hypoglycemia and it is risk among primary school teachers in Riyadh Saudi Arabia and they mentioned that more than half of teachers had more than 10 years of working experience and also with **(Al Duraywish & Abdelsalam, 2017)** who conducted astudy in Al – Jouf Saudi Arabia about assessment of primary and intermidiate schools staffs knoweldge , attitude and practice on care of children with type 1 diabetes at school , in Al – Jouf Saudi Arabia and who mentioned that more than half of teachers had more than 10 years of working experience.

Related to having diabetes, less than one-fifth of studied teachers had diabetes. This is supported by **(Aldekhayel, 2020)** who mentioned that less than one-fifth of studied teachers had diabetes.

The present study showed that about two third of the studied teachers had positive family history of diabetes. This results agreed with **(Aldekhayel, 2020)** who mentioned that about three–quarter of the studied teachers had family members with diabetes**.**

The result of the current study was found that more than one third of teachers have diabetic student in their class. This finding dissimilarity with **(Aloriney et al., 2021)** who conducted astudy in Riyadh Saudi Arabia about assessment and knoweldge of type 1 diabetes in university based school in Riyadh Saudi Arabia and they mentioned that more than two third of teacher have diabetic student in their classes. This high frequency implies that teachers should be well-prepared to deal with this sensitive health problem among students.

The present study revealed that only 7.5 % of studied teachers receive training about T1DM. This result is supported by **(Al Bahlool, 2017)** who conducted astudy in Tabouk city , Saudi Arabia about assessment of knowledge , attitude and management practices of type 1 diabetes among primary school teachers in Tabouk city, Saudi Arabia and who mentioned that only 4.1% of studied sample received training about the symptoms and treatment of T1DM.

The present study showed that an acceptable proportion of studied teachers correctly answered the symptoms of diabetes mellitus, polyuria, polydipsia,

extreme hunger, fatigue lack of concentration, and loss of weight in diabetic patients. This may due to presence of positive family history of DM for some of the studied teachers. These results agreed with **(Alshammari & Haridi, 2021)** who conducted study in northern Saudi Arabia about teachers knowledge about type1diabetes in public elementary schools in northern Saudi Arabia and they mentioned that most participants were aware of symptoms of T1DM as: frequent urination , increased thirst, fatigue and lack of focus and weight loss.

The current study found that more than half of the studied teachers know that diabetic students should take sweets or juices before physical activities. This finding could be due to exposure to direct experience with diabetic case. Similar result were reported by **(Alzaidi et al., 2020)** who conducted astudy in Al – Jouf Saudi Arabia about assessment of primary and intermidiate schools staffs knoweldge , attitude and practice on care of children with type 1 diabetes at school , in Al – Jouf Saudi Arabia and they reported that more than half of participant know that diabetic students should take sweets or juices before physical activities class.

This study reported that more than one-third of the participants mentioned that the school children are usually affected by T1DM. This might clarify by the teachers had more than one-third of diabetic students in their class. This results disagreed with **(Alshammari & Haridi, 2021)** who reported that the majority of studied teachers know that school children are usually affected by T1DM. This may be due to differences in sample size.

The current study reported that one-third of studied teachers know that T I DM is treated with insulin. This may be due to presence of diabetic student in classes . The results of the present study are in line with**(Alzaidi et al., 2020)** who found that two-fifths of studied teachers know that T I DM is treated with insulin.

The current study disclosed that two-fifth of studied teachers had a poor score of knowledge regarding T I DM. This might explain by the shortage of health education campaigns related to T I DM among the studied teachers. This result was similar with **(Alzaidi et al., 2020)** who stated that two fifth of studied teachers had poor knowledge and disagree with **(Hamza et al., 2022)** who conducted study in the Numaniyah District/ Waist Province about effectiveness of an education program on primary school teachers knowledge toward type 1 diabetes and they reported that two thirds of school teacher's expressed a poor level of knowledge about T1DM.

The study detected that more than half of studied sample agreed that diabetes affects negatively on learning capabilities/ academic performance in such

children. This result agreed with **(Razan, 2020)** who conducted study in Abha City about knowledge, attitude and practice of school teachers regarding acute complication of type 1 diabetes in Abha City and who reported that nearly half of studied teachers agree that diabetes affects negatively on learning capabilities/ academic performance in such children.

The present study detected that more than one third of studied teachers agreed that diabetic students should be treated as their peers. This finding contrast with **(Mustafa et al., 2022)** who demonstrated that more than three-quarter of studied teachers agreed that diabetic students should be treated the same as their peers.

In this study nearly two third of studied teachers were willing to have diabetic children in their classes. This finding was in contrast with **(Aldekhayel, 2020)** who demonstrated that the majority of participant were not willing to have diabetic children in their classes. This could be attributed to anxiety or worry from responsibility that caring for a diabetic child.

The majority of studied sample agree that teachers had a role in educating students about DM. the current result disagreed with **(Al Bahlool, 2017)** who mentioned that only 15.4% of the studied sample agree that teachers had a role in educating students about DM.

The proposed study results revealed that more than two-thirds of the studied teachers had a positive attitude toward type 1 diabetes. Positive attitude could be attributed to the high prevalence of diabetes in Egypt as well as the high educational level of the studied population. This result was supported by **(Aldekhayel, 2020)** who reported that more than half of the studied teachers had positive attitude.

In the current study being adiabatic teachers, receiving previous training about diabetes, having diabetic students, and increasing attitude scores were significant predictors for improving knowledge scores. Similar result **(Alshammari & Haridi, 2021)** who reported that the factors that have an independent positive association with teacher's good knowledge: received training in caring diabetic students, have/ever had diabetic student/s in her class, and the teacher himself is diabetic.

Conclusion:
Based on the present study findings, it can be concluded that studied primary school teachers had low level of good knowledge regarding T1DM, and acceptable percentage had positive attitude regarding T1DM.

Recommendations:
- Health education programs should be developed and implemented for teachers to increase their awareness about type 1 diabetes.
- Large study about T1DM on large scale is recommended
- Arabic language booklet show symptoms and management of T1DM should available in library school.

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