Original Research Paper

Knowledge, Attitude and Practice among Primary School Teachers towards Diabetic Emergencies, Baghdad

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ABSTRACT:

Background: Diabetes is a chronic, metabolic disease that characterized by elevated level of blood glucose, which in turn over time leads to serious damage to many organs. In Iraq the prevalence of type 1 DM in primary school children was 159 per 100,000. This put more pressure on schools and teachers as children may have first complication at school. Aim: To assess the primary school teachers' knowledge, attitude and practice of the clinical presentation of the life-threatening complications of diabetes mellitus among school children. Subjects and Method: This was a cross sectional study conducted in twenty primary school in Al Rusafa district, Baghdad, Iraq during a period from 1st August to end of November 2020. A convenient sample of 400 teachers agreed to participate and met the inclusion criteria. The responses were collected online and incomplete questionnaires were excluded from the analysis, the collected data were introduced to Microsoft excel sheet (2016) and loaded into SPSS-V24 statistical program. Results: Out of 400 teachers, 357 teachers completed questionnaire with a response rate of (89.25%). There was 59% of the studied sample had fair knowledge level, 65% of had good attitude level, and 77% of the studied sample had poor practice level. The age, work duration, specialty, qualification, presence of DM students in class, and school DM records were statistically significant associated with knowledge, attitude, and practice of teachers. Conclusion: The knowledge score was fair; attitude was good and practice of teachers regarding diabetes mellitus type 1 student's poor. The age, work duration, specialty, qualification, presence of DM students in class, and school DM records were positively impacting the knowledge, attitude, and practice of teachers.

Keywords: Diabetes, school, knowledge, attitude, practice

INTRODUCTION:

Diabetes is a chronic, metabolic disease that characterized by elevated level of blood glucose, which in turn over time leads to serious damage to the many organs including heart, blood vessels, eyes, kidneys and nerves.[1] There are 2 types of diabetes, type 1, usually adult type, and Type 1 diabetes, previously was called juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas secrete little or no insulin.[2] In children and teens, type 1 DM is the most common type, which represent around 90% of DM cases in children aged 15 years old and less.[3] Now, younger teens also get type 2 due to increase obesity among them.[4] Children with diabetes have many emergencies, some of them considered life threatening.[5] As children have a lot of their time in school, teachers should

understand diabetes and its threatening conditions, and for that, a school must be provided with both a diabetes action plan and a diabetes management plan, and do so, assessing the knowledge of teachers is mandatory and important to provide child with best first aid in case of diabetes emergency condition has emerged in school.[6] Many studies have been assessing the KAP among teachers worldwide,[7, 8, 9] however, there was no study conduct in Iraq to assess the KAP among teachers.

DIABETES AND SCHOOL:

School teachers plan an important and crucial role in managing emergencies of DM in children. As those emergencies are very time sensitive, proper planning and

management of children with such emergencies could plan an important role in prevent further complication and sequelae.[10]

Important points of management of diabetes at school are[11]:

- A school must be provided with both a diabetes action plan and a diabetes management plan developed by child's diabetes educator. The plans must clearly outline the details of child's diabetes management during school hours.
- The plan should include management of [12]:
  o Blood glucose monitoring
  o Hypoglycemia (early symptoms include shaking or trembling, sweating, paleness, hunger, light-headedness, headache, dizziness, pins and needles around mouth, mood change)
  o hyperglycemia (acute symptoms include excessive thirst, frequent and copious urination, tiredness and blurred vision)
  o exercise
  o dietary needs
  o the child's insulin regimen
  o emergency contact details

AIMS OF THE STUDY:

1. To assess the primary school teachers' knowledge, attitude and practice of the clinical presentation of the life-threatening complications of diabetes mellitus among school children.
2. To assess the association between socio demographic factors and level of school teachers' knowledge, attitude and practice.

SUBJECT AND METHOD:

Study design, Setting and Data collection time:
This was a cross sectional study conducted in 20 primary schools in Al Rusafa district, Baghdad, Iraq during a period from 1st of August to end of November 2020.

Study population and sampling procedure:
The study was conducted using a convenient method of sampling. The study population will involve all teachers at primary school worked for at least one year. The questionnaires were distributed to those who agreed to be recruited in the study online, and then were recollected from them.

Pilot study:
Pilot study was conducted on forty participants from these schools to pretest the tool of the study. The purposes of pilot were:

To assess the applicability of the tool.
To find any difficult or unclear questions.
To explore any administrative or technical obstacles.
After pilot study, no major changes were made on study tool apart from trivial modifications on Arabic version which were made according to Iraqi culture. The participants involved in pilot study were excluded from the study.

Ethical and official approval:
Written permissions from Program of Family and Community Medicine and Ministry of Education were obtained before conducting the research. Permission of all primary school directors and teachers who participated in the study were obtained. The researcher tried his best not to disturb the primary schools; she visited all the schools after arranging with the schools directors. The individual consent from each teacher to participate in the study was a prerequisite for data collection. All participants were informed that their responses would remain confidential.

Data collection tools:
The used questionnaire was adopted from previous studies measuring the same studied variables and translated into local Arabic language, the questionnaire was revised by supervisor and panel of experts in Al-Kindy College of Medicine. (Two Community Medicine, two Family Medicine) and their modification and advice regarding the proposed questionnaire was taken in consideration.
A questionnaire had been sent to teachers at selected school via online platform to collect needed information; (Appendix 1) the questionnaire was filled by the participants in Arabic language. It was used to gather the necessary information as the following:

Demographic information:
The demographic information included:
1. Age (in years)
2. Gender (male, female)
3. Qualification (Teachers Institute, university)
4. Marital status (Single, married, others)
5. Work duration (in years)
6. Specialty. (Scientific, Literature. Sport and art)

Other variables:
7. Main source of information about DM type (net, personal experience, doctors, mass media and friends).
8. Presence of DM student in their classes. (yes, no, don't know)

9. Presence of DM records in the school. (Yes, no, don't know)

Assessment of Knowledge:

Data about knowledge which include 2 division, first one 8 closed questions with yes and no responses :(correct answer is yes for all questions)

1. DM leads to polyuria
2. DM leads to polydipsia
3. DM leads to fatigue and lack of concentration
4. DM leads to loss of weight
5. Type I DM is treated with insulin
6. Tremors and sweating means hypoglycemia
7. The diabetic student should take sweats or juices before physical activity class
8. Glucose is essential for the brain to function

For each correct answer (True) given a one point and a total of 8 points for this section.

The second division of knowledge assessment consist of 4 multiple chose questions:

1- A major concern for the school child with diabetes is the likelihood of developing?
   a) High blood glucose problems
   b) Infections
   c) Low blood glucose problems (**Correct answer**)
   d) Both a and c
   e) Not sure

2- A sign of high glucose in a child with diabetes may be?
   a) Feeling shaky
   b) Having to go to the bathroom frequently. (**Correct answer**)
   c) Irritability
   d) Not sure

3- A general rule for treatment of low blood glucose is?
   a) Call the child physician
   b) Give some form of glucose as quickly as possible. (**Correct answer**)
   c) Make sure that the child is given more insulin
   d) Not sure

4- Glucagon is?
   a) A hormone that lower blood glucose level
   b) A medication that mimics insulin
   c) A hormone that raises blood glucose levels. (**Correct answer**)
   d) Not sure

A total score of 12 points is given for knowledge section.

Assessment of Attitude:

Data about attitude which include 9 closed questions with agree, neutral, and disagree responses:

1. Diabetic student shouldn't be treated the same as other peers as they deserve special attention?
   Correct answer is agree.
2. Students with DM pretend ill to win their sympathy?
   Correct answer is disagree.
3. Providing diabetes care to a student is not their responsibility, but a family responsibility?
   Correct answer is agree.
4. Teachers' have a role in gathering information updating their knowledge about DM?
   Correct answer is agree.
5. Teachers should educating students about DM and its prevention?
   Correct answer is agree.
6. Teachers should counseling and advising diabetic student?
   Correct answer is agree.
7. I confident in own abilities to manage DM?
   Correct answer is agree.
8. I'm ready to attend training about DM care?
   Correct answer is agree.
9. Are you willing to have diabetic children in your class?
   Correct answer is agree.

A total score of 9 points given for attitude section.

Assessment of Practice:

Data about practice which include 16 closed questions with done, not done, and not applicable responses:

1. Have you ever try to have competency in using glucometer?
2. Do you allow student to use restroom more than once at class time?
3. Do you give the permission for the student to perform self-injection of insulin in the class?
4. Have you ever help diabetic student in making decisions?48
5. Have you ever try to have competency in insulin injection?
6. Have you ever discuss parents about student's condition at the beginning of school years?
7. Have you ever prevent diabetic student from eating sweets at school?
8. Do you give permission for the student to eat his meal and snack anywhere, including the classroom?
9. Do you ask school administration to provide food and drinks for student all the school day?
10. Do you talk about DM with diabetic student and all classmates?

11. Have you ever getting emergencies help immediately to a diabetic student lose his consciousness?
12. Do you make a list for diabetic student medications and time of administration while in school?
13. Do you know meal and snacks schedule and remind the student to take snack at time?
14. Do you allow student to have free access to fluids (i.e. Water) as necessary?
15. Are you keeping some types of sugar in class to treat hypoglycemic reaction?
16. Have you ever ask parent to provide the school with glucometer, medication and snacks?

The correct answer for each above question is done, and for each corrected answers given a one point. A total of 16 points are given for practice section.

Scoring:
The Knowledge, Attitude and Practice scores were calculated by dividing the total number of correct answers in each KAP items by the total number of questions in that item and multiply the results by 100
For example
Knowledge score

$$= \frac{Number\ of\ knowledge\ questions\ answered\ correctly}{Total\ number\ of\ knowledge\ questions}$$
$$\times 100$$

A score of **< 50** was considered 'poor', and a score of **50-75** was considered fair, while score of **>75** was considered good. [59]

STATISTICAL ANALYSIS:
Collected data were reviewed and entered into Microsoft Excel Sheet 2016 and loaded into SPSS software version for statistical analysis. Descriptive statistics were presented as frequencies and percentages. Continuous variables were presented as (Means ± SD). Chi – square test was used in inferential statistics to find out significance of related variables. P – value < 0.05 was considered as the discrimination point of significance.

RESULTS:
The results of this cross-sectional study show that out of (400) teachers invited to participate in the study, 357 teachers completed questionnaire with a response rate of (89.25%). Table 1 shows that 49.6% aged 40 years or less, only 8.4% of the respondents were males. Regarding marital status, 13.4%, 78.2% and 8.4% were single, married and divorced or widowed (others) respectively. The work duration of 64.7% were less than 20 years, the specialty of 42%, 46.2% and 11.8% were scientific, literature and sport and art respectively, the qualification of 33.1% was institute and 66.9% fished university education.

Table 1. Distribution of studied sample according to essential variables		N	%
Age	<40 year	177	49.60%
	≥40 years	180	50.40%
Gender	Male	30	8.4%
	Female	327	91.6%
Marital status	Single	48	13.4%
	Married	279	78.2%
	Others	30	8.4%
Work duration	<20 years	231	64.7 %
	≥20 years	126	35.3%
Specialty	Scientific	150	42.0%
	Literature	165	46.2%
	Sport and art	42	11.8%
Qualification	Teachers Institute	118	33.1%
	University	239	66.9%

Figure 1 shows that the main source of information about type 1 DM is the net (46%) followed by personal experience (20%), doctors (14%), mass media (11%), and friends (9%).
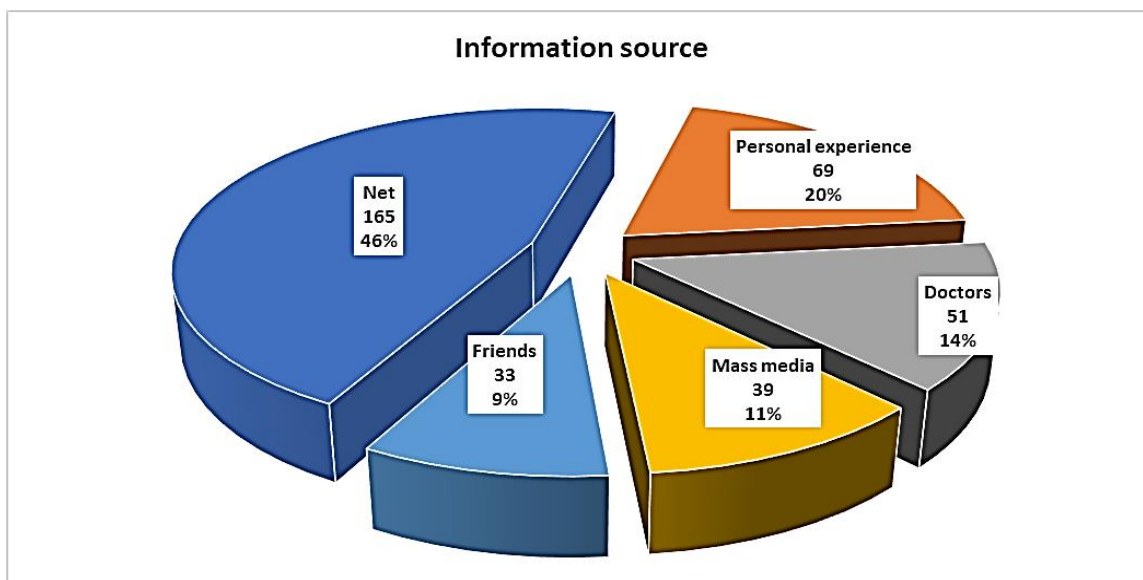
Figure: 1. Distribution of studied cases according to source of information.

As shown in table 2. 31% of studied sample stated that there were DM children in their schools and 37% mentioned that their schools had DM records.

Table 2 presence of DM students and school DM records according to studied subjects			
Presence of DM student in the class	Yes	114	31.9%
	No	132	37.0%
	Don't know	111	31.1%
Presence of School DM record	Yes	132	37.0%
	No	72	20.2%
	Don't know	153	42.9%

Table 3 shows that 94.4% of studied sample think that DM leads to polyuria in diabetic patients, 88.24 DM leads to polydipsia in diabetic patients,88.2% DM leads to fatigue and lack of concentration in diabetic patients, 79.8%DM leads to loss of weight in diabetic patients, 51.3%Type I DM is treated with insulin, 74.8%Tremors and sweating means hypoglycemia in diabetic students, 36.1%The diabetic student should take sweats or juices before physical activity class, and 56.3% Glucose is essential for the brain to function. In all above questions the rate of correct answers was found to be significantly higher that wrong or not sure answers except question 7 (The diabetic student should take sweats or juices before physical activity class) where 42% declared that they are not sure, p value <0.001 in all conditions.

		Table 3. Description of the assessment of teacher's knowledge							
	Variables	True		False		Not sure		X^2	P value
		N	%	N	%	N	%		
1	DM leads to polyuria	337	94.4	0	0	20	5.6	247	0.001
2	DM leads to polydipsia	315	88.2	0	0	42	11.8	208	0.001
3	DM leads to fatigue and lack of concentration	315	88.2	6	1.68067	36	10.1	488	0.001
4	DM leads to loss of weight	285	79.8	12	3.36134	60	16.8	357	0.001

5	Type I DM is treated with insulin	183	51.3	51	14.2857	123	34.5	73	0.001
6	Tremors and sweating means hypoglycemia	267	74.8	12	3.36134	78	21.8	294	0.001
7	The diabetic student should take sweats or juices before physical activity class	129	36.1	78	21.8487	150	42.0	23	0.001
8	Glucose is essential for the brain to function	201	56.3	6	1.68067	150	42.0	171	0.001

Table 4 shows that 29.4% think that a major concern for the school child with diabetes is the likelihood of developing low blood glucose, 64.7% think that having to go to the bathroom frequently is a sign of high glucose in a child with diabetes, 53.8 said that A general rule for treatment of low blood glucose is Give some form of glucose as quickly as possible, but 61.3 were not sure about the rule of Glucagon hormone, the rate of correct answers is significantly higher than the rate of other answers except the rule of glucagon where the not sure answer is significantly higher, p value<0.001 in all conditions.

Table 4. Description Complete assessment of teacher's knowledge				
Items	N	%	X2	P value
A major concern for the school child with diabetes is the likelihood of developing				
High blood glucose problems	63	17.6		
Infections	0	0.0		
Low blood glucose problems	105	29.4	12	0.001
Both a and c	99	27.7		
Not sure	90	25.2		
A sign of high glucose in a child with diabetes may be				
Feeling shaky	57	16.0		
Having to go to the bathroom frequently	231	64.7	158	0.001
Irritability	0	0.0		
Not sure	69	19.3		
A general rule for treatment of low blood glucose is				
Call the child physician	111	31.1		
Give some form of glucose as quickly as possible	192	53.8	215	0.001
Make sure that the child is given more insulin	12	3.4		
Not sure	42	11.8		
Glucagon is				
A hormone that lower blood glucose level	12	3.4		
A medication that mimics insulin	33	9.2	291	0.001
A hormone that raises blood glucose levels	93	26.1		
Not sure	219	61.3		

Figure 2 shows that the 13%, 59% and 28% of the studied sample had good, fair and poor knowledge level respectively.
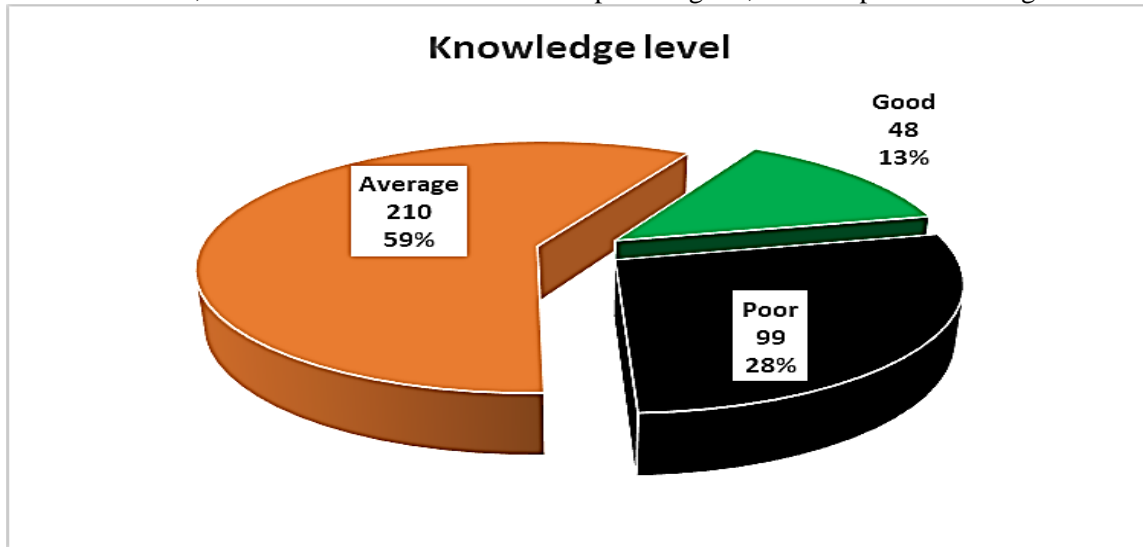

Figure: 2. Distribution of studied cases according to knowledge level.

As shown in table 5 the rate of poor knowledge among young teacher was significantly lower than that of older teacher, p value=0.001, the rate of poor knowledge among short work duration teachers was significantly lower than that of longer duration group, p value, p value=0.001, art or sport specialty teachers had significantly higher rate of poor knowledge, p value=0.001. Teachers with lower educational qualification had higher rate of poor knowledge, p value= 0.001. Teachers who didn't know if there is diabetic student in their schools had higher rate of poor knowledge, p value=0.001. Teachers who didn't know if there is diabetic students record in their schools had higher rate of poor knowledge, p value=0.001. Gender and marital state had no significant association with teachers knowledge level, p vale>0.05 in both conditions.

Table 5 association between studied variables and level of knowledge			Knowledge level						
			Poor 99		Average 210		Good 48		P value
			N	%	N	%	N	%	
Age	<40 year	177	69	39	90	50.8	18	10.2	0.001
	≥40 years	180	30	16.7	120	66.7	30	16.7	
Gender	Male	30	8	26.70%	16	53.30%	6	20.00%	0.541
	Female	327	91	27.80%	194	59.30%	42	12.80%	
Marital status	Single	48	21	43.80%	24	50.00%	3	6.30%	0.06
	Married	279	72	25.80%	168	60.20%	39	14.00%	
	Others	30	6	20.00%	18	60.00%	6	20.00%	
Work duration	<20	231	82	35.50%	129	55.80%	20	8.70%	0.001
	≥20	126	17	13.50%	81	64.30%	28	22.20%	
Specialty	Scientific	150	42	28.00%	81	54.00%	27	18.00%	0.001
	Literature	165	36	21.80%	111	67.30%	18	10.90%	
	Sport and art	42	21	50.00%	18	42.90%	3	7.10%	
Qualification	Teachers Institute	118	46	39.00%	66	55.90%	6	5.10%	0.001
	University	239	53	22.20%	144	60.30%	42	17.60%	
DM student	Yes	114	24	21.10%	72	63.20%	18	15.80%	0.033
	No	132	33	25.00%	78	59.10%	21	15.90%	
	Don't know	111	42	37.80%	60	54.10%	9	8.10%	
School DM records	Yes	132	11	8.33%	96	72.73%	25	18.94%	0.001
	No	72	27	37.50%	33	45.83%	12	16.67%	
	Don't know	153	61	39.87%	81	52.94%	11	7.19%	

Table 6 shows that most teachers good scores on items measured attitude (agree were marked by 79.8%,79.8%,90.8%,92.4%,59.7%, 73.9%,81.5% and 93.3% of teachers on items 1,3,4,5,6,7,8,9and10 respectively), the only items deviated from agreement is item 2 where 40.3% pointed neutral choice, p value <0.05 in all conditions.

Table 6 Description of the assessment of teacher's attitude								
ITEMS	Attitude						Chi sq.	
	A		N		DA		X2	P v
	No.	%	No.	%	No.	%		
1	Diabetic student shouldn't be treated the same as other peers as they deserve special attention	285	79.8	21	5.9	51	14.3	351	0.001
2	Students with DM pretend ill to win their sympathy	108	30.3	144	40.3	105	29.4	916	0.001
3	Providing diabetes care to a student is not their responsibility, but a family responsibility	285	79.8	3	0.8	69	19.3	365	0.001
4	Teachers' have a role in gathering information updating their knowledge about DM	324	90.8	6	1.7	27	7.6	531	0.001
5	Teachers should educating students about DM and its prevention	330	92.4	3	0.8	24	6.7	563	0.001
6	Teachers should counseling and advising diabetic student	213	59.7	36	10.1	108	30.3	133	0.001
7	I confident in own abilities to manage DM	264	73.9	33	9.2	60	16.8	268	0.001
8	I'm ready to attend training about DM care	291	81.5	6	1.7	60	16.8	385	0.001
9	Are you willing to have diabetic children in your class?	333	93.3	3	0.8	21	5.9	578	0.001
10	A=Agree, N=Neutral, DA=Dis agree								

Figure 3 shows that the 65%, 28% and 14% of the studied sample had good, fair and poor attitude level respectively.
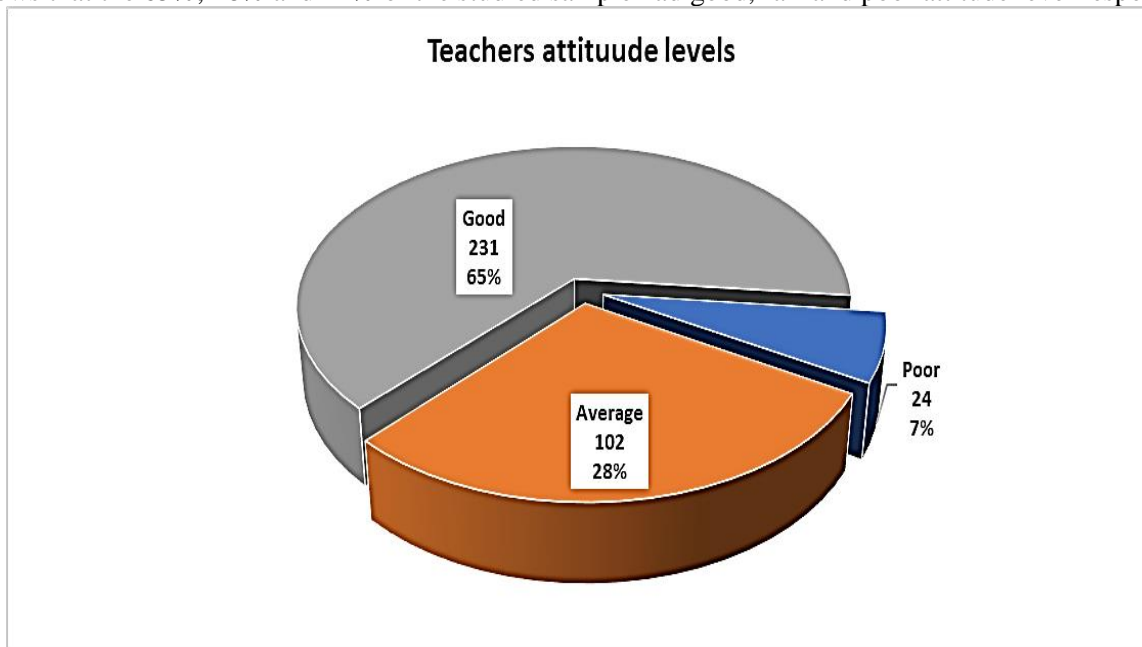

Figure: 3. Distribution of studied cases according to attitude level

As shown in table 7 the rate of poor attitude among young teacher was significantly lower than that of older teacher, p value=0.001, the rate of poor attitude among short work duration teachers was significantly lower than that of longer duration group, p value=0.001, art or sport specialty teachers had significantly higher rate of poor knowledge, p value=0.001. Teachers with lower educational qualification had higher rate of poor knowledge, p value= 0.001. Teachers who didn't know if there is diabetic student in their schools had higher rate of poor knowledge, p value=0.001. Teachers who didn't know if there is diabetic students record in their schools had higher rate of poor knowledge, p value=0.001.

Table 7 association between studied variables and level of attitude

			Attitude level						
			Poor 24		Average 102		Good 231		
			N	%	N	%	N	%	
Age	<40 year	177	6	3.39%	72	40.68%	99	55.9	
	≥40 years	180	18	10.00%	30	16.67%	132	73.3	0.001
Gender	Male	30	4	13.30%	6	20.00%	20	66.70%	
	Female	327	20	6.10%	96	29.40%	211	64.50%	0.224
Marital status	Single	48	6	12.50%	9	18.80%	33	68.80%	
	Married	279	18	6.50%	87	31.20%	174	62.40%	0.063
	Others	30	0	0.00%	6	20.00%	24	80.00%	
Work duration	<20	231	15	6.49%	84	36.36%	132	57.1	
	≥20	126	9	7.14%	18	14.29%	99	78.6	0.05
Specialty	Scientific	150	12	8.00%	45	30.00%	93	62.00%	
	Literature	165	9	5.50%	45	27.30%	111	67.30%	0.859
	Sport and art	42	3	7.10%	12	28.60%	27	64.30%	
Qualification	Teachers Institute	118	7	5.90%	24	20.30%	87	73.70%	
	University	239	17	7.10%	78	32.60%	144	60.30%	0.038
DM student	Yes	114	6	5.30%	15	13.20%	93	81.60%	
	No	132	9	6.80%	51	38.60%	72	54.50%	0.001
	Don't know	111	9	8.10%	36	32.40%	66	59.50%	
School DM record	Yes	132	3	2.30%	30	22.70%	99	75.00%	
	No	72	12	16.70%	21	29.20%	39	54.20%	0.001
	Don't know	153	9	5.90%	51	33.30%	93	60.80%	

Table 8 show that is a significant relation between the items of teacher practices and answer while (increase in the percentage of done answer), where percentage respectively) (Q1=58.8%, Q2=78.2% and Q13=91.6%) where X2= (156, 332 and 545) and P-value=0.001.

While that is a significant relation between the not done item of Q3=58%, Q4=82.4%, Q5=49.65, Q6= 70.6%,Q7=47.6%, Q8=41.2%,Q9=67.2%, Q10=54.6%, Q11=76.5, Q12=68.1%, Q14=46.2%, Q15=78.2%, and Q16=58.2%) (43.8%, X2= 51.810 and P-value=0.001).

Table 8. Description of the **assessment of teacher's practice**

Questions		Practice						Chi sq.	
		D		ND		NA			
		N	%	N	%	N	%	X2	P v
1	Have you ever try to have competency in using glucometer?	210	58.8	129	36.1	18	5.0	156	0.001
2	Do you allow student to use restroom more than once at class time?	279	78.2	63	17.6	15	4.2	332	0.001
3	Do you give the permission for the student to perform self injection of insulin in the class?	69	19.3	207	58.0	81	22.7	98	0.001
4	Have you ever help diabetic student in making decisions?	9	2.5	294	82.4	54	15.1	394	0.001

#	Question							
5	Have you ever try to have competency in insulin injection?	162	45.4	177	49.6	18	5.0	129	0.001
6	Have you ever discuss parents about student's condition at the beginning of school years?	69	19.3	252	70.6	36	10.1	227	0.001
7	Have you ever prevent diabetic student from eating sweets at school?	138	38.7	171	47.9	48	13.4	68	0.001
8	Do you give permission for the student to eat his meal and snack anywhere, including the classroom?	132	37.0	147	41.2	78	21.8	22	0.001
9	Do you ask school administration to provide food and drinks for student all the school day?	87	24.4	240	67.2	30	8.4	198	0.001
10	Do you talk about DM with diabetic student and all classmates?	135	37.8	195	54.6	27	7.6	121	0.001
11	Have you ever getting emergencies help immediately to a diabetic student lose his consciousness?	21	5.9	273	76.5	63	17.6	306	0.001
12	Do you make a list for diabetic student medications and time of administration while in school?	63	17.6	243	68.1	51	14.3	194	0.001
13	Do you know meal and snacks schedule and remind the student to take snack at time?	327	91.6	18	5.0	12	3.4	545	0.001
14	Do you allow student to have free access to fluids(i.e. Water)as necessary?	147	41.2	165	46.2	45	12.6	70	0.001
15	Are you keeping some types of sugar in class to treat hypoglycemic reaction?	30	8.4	279	78.2	48	13.4	324	0.001
16	Have you ever ask parent to provide the school with glucometer, medication and snacks?	105	29.4	210	58.8	42	11.8	121	0.001

D=Done, ND=Not done, NA=Not applicable

Figure 4. shows that the 1%, 22% and 77% of the studied sample had good, fair and poor practice level respectively.
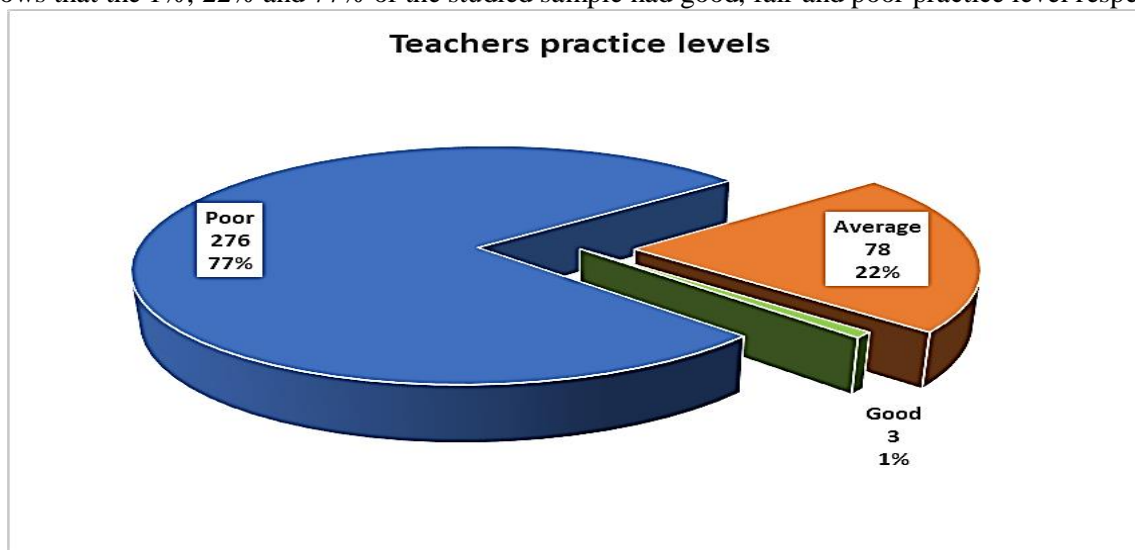

Figure: 4. Distribution of studied cases according to practice level.

As shown in table 9 the rate of poor practice among young teacher was significantly lower than that of older teacher, p value=0.001, the rate of poor practice among short work duration teachers was significantly lower than that of longer duration group, p value, p value=0.006, teachers who didn't know if there is diabetic student in their schools had higher rate of poor knowledge, p value=0.001. Teachers worked in school with no diabetic students record in their schools had higher rate of poor knowledge, p value=0.001. Marital state, specialty and qualification had no significant association with teachers practice level, p vale >0.05 in all conditions

Table 9 association between studied variables and level of practice

			Practice level				
			Poor 276		Average-good 81		P value
			N	%	N	%	
Age	<40 year	177	153	86.44%	24	13.56%	0.001
	≥40 years	180	123	68.33%	57	31.67%	
Gender	Male	30	25	83.30%	5	16.70%	0.411
	Female	327	251	76.80%	76	23.20%	
Marital status	Single	48	36	75.00%	12	25.00%	0.001
	Married	279	225	80.60%	54	19.40%	
	Others	30	15	50.00%	15	50.00%	
work duration	<20	231	186	80.52%	45	19.48%	0.05
	≥20	126	90	71.43%	36	28.57%	
specialty	Scientific	150	111	74.00%	39	26.00%	0.159
	Literature	165	135	81.80%	30	18.20%	
	Sport and art	42	30	71.40%	12	28.60%	
Qualification	Teachers Institute	118	87	73.70%	31	26.30%	0.256
	University	239	189	79.10%	50	20.90%	
DM student	Yes	114	69	60.50%	45	39.50%	0.001
	No	132	108	81.80%	24	18.20%	
	Don't know	111	99	89.20%	12	10.80%	
School DM record	Yes	132	78	59.10%	54	40.90%	0.001
	No	72	66	91.70%	6	8.30%	
	Don't know	153	132	86.30%	21	13.70%	

DISCUSSION:

Knowledgeable trained personnel are essential for the student to avoid the immediate health risks of low blood glucose and to achieve the metabolic control required to decrease risks for later development of diabetes complications and by assessing the knowledge among teachers helped us to identify the gap in knowledge and its impact on both attitude and practice. The invitation for participation was given for 400 teachers and the response rate was 89% which was comparable to a study conducted in Saudi Arabia among teachers in which the response rate was 88%.[13] In more than half of the participants, the age was above 40 years old which was lower in comparison to Aldekhayel's study that showed a 40% of their participants have an age less than 40 years.[14] Also, the work duration among participants showed that more than 35% of participants had a work duration of more than 20 years. This indicates that good experience years among participants of this study making them exposed to different student's medical conditions including DM emergencies. The majority of participants in this study were females and this was higher than the Saudi Arabia's study, in which the females represented 47% of the participants.[52] Also, in another study in Saudi Arabia, females were represented 60% of the participants.[15] The same percentage for females (60%) was observed in a study conducted in Al-Bahrain.[44] The specialties background among the participants in this study were scientific, literature, and sport, with the majority of participants were either scientific or literature. This was in line with other studies conducted in Saudi Arabia [52, 51], however, the mean difference between this study and other studies was the inclusion of school nurses and health personnel in the schools, which we lack among Iraqi schools. In more than 2/3 of participants, their qualification was a university degree. This was lower than AlBahlool's study, in which more than 95% of participants were holding a university degree.[51] Also, Fasil's et al study among Bahraini teachers showed around 81% of

participants were holding a university degree.[44] Furthermore, in Makah, Almehmad's et al study showed a 15% of participants had a doctorate degree in education.[45] A study in Turkey showed a 79% of teachers who participated in their study, to assess the DM knowledge specifically in the area of managing DM at school, have a university degree.[32] Higher education might have a bigger opportunity for a better understanding of DM among children and the management of diabetic emergencies. The source of information is important, having information from an untrusted source could lead to false knowledge in which the impact of the right decisions for management could be affected. Around half of the participants in this study gain their knowledge from internet sources, while a small fraction of participants gaining their knowledge from doctors. Remarkably, none of the participants reported any participation in an educational program for diabetes mellitus among children. In Ghana, the main source of information was from television, radio, and newspapers, in which more than 60% of participants gained their knowledge from that.[34] There were multiple programs that have been developed to increase the knowledge of school staff to deal with diabetes emergencies, one of those programs was in Turkey and over 10 years, it showed a significant increase in knowledge among teachers.[42] In the current study, there were one third of participants did not know if there is a student with DM in their class nor having a DM record in their school. This results was lower in comparison to Greek study, in which there were 87% of teachers knows whether there is a student with DM in their class or not.[41]

Diabetes Knowledge among Teachers:
The level of knowledge regarding DM among participating teachers showed that most of them have average knowledge. While level of knowledge in a study conducted in Turkey by Aycan et al, showed that 80% of their participants have a low or moderate level of knowledge regarding DM. Also the comparison was in line with a study in Ghana which showed that a limited knowledge was observed among their participants.[34] In Rebecca's et al study, their results reveled that there was inadequate knowledge among initial teacher trainee.[16] While in Saudi Arabia, the level of knowledge among teachers were relatively higher, in another two studies, they reported that moderate knowledge among their participant reaching to 50% were knowledgeable about DM.[45, 52] In Greek study, the knowledge was higher among participants in comparison to this study results, which showed a mean of correct answer was 80%.[41] The age of participants played a significant role in knowledge level, in which a significant higher level of

knowledge among older teachers. This results was in line with Aldekhayel's study, in which the significant level of knowledge was observed among older teacher.[52] Also, AlBahlool's study demonstrated same results regarding the age, which showed a more knowledge was observed among older teachers too.[51] This indicate that, young teacher need more information regarding DM in their training years. Also, the experience years was significantly associated with a level of knowledge and higher knowledge level was among teacher with higher experience years. This result was in line with the Greek study and AlBahlool's study, in which both studies demonstrated higher knowledge levels were observed among higher experience.[41, 51] This demonstrated that the majority of knowledge level was gaining from experience rather than education. As a result of this study showed that teacher who had a DM student in their class had more knowledge regarding the DM, no other studies examine the effect of having DM student on teachers knowledge. Also, teachers' qualification was important factor determining the higher level of knowledge, in which there was a significant higher level of knowledge among teachers with university degree. This was in line with other studies conducted in Greek and Saudi Arabia, that showed a higher level of education associated with higher level of knowledge of DM.[41, 51] The higher degree might associated with good training quality programs that influence the level of knowledge among teachers. Majority of participants know the symptoms of DM patients and more than 75% of them knows that the tremor and sweating a signs of hypoglycemia. While the specific knowledge regarding the DM were poor among teachers, namely, only 29% of teachers think that a major concern for the school child with diabetes is the likelihood of developing low blood glucose. While in Aycan's et al study, in which a high proportion of participants have good knowledge about the symptoms of DM while the participants showed a low level of knowledge for specific information of DM.[32]

Diabetes attitude among Teachers:
The second section in this study was dedicated to assess the attitude of teachers toward the DM among students. More than half of teachers showed a good attitude. This was relatively higher for attitude in comparison to Aldekhayel's study, in which the good attitude was observed in 59% of participants.[52] Also, the young teachers were have the poorer attitude as well as among the teacher with short duration of work. This was in line with Aldekhayel's study too, and remarkably, out of all factors, only the experience years and presence of DM student in class were associated with positive attitude,

while all other factors did not show a statistically significant difference. [52] In our study, in addition to work experience, qualification and presence of DM student in class were associated with positive attitude, also, this was observed in Aldekhayel's study too.[52] The majority of teachers who participated in this study have agreed on attitude question and they have the welling to help DM students with their condition to provide a better environment for them.

Diabetes Practice among Teachers

Regarding the practice, which is represent the third pillar of this study, majority of participants have poor practices toward DM student, and only 3% of them have good practice. This was significantly lower than Aldekhayel's study that showed the good practices was observed among 54% of participant. [52] Also, in Ghana, there was higher percentage of good practice in comparison to our study.[34] The age of the teacher, experience years, and presence of DM students in the class were associated with a higher level of good practice significantly. While Aldekhayel's study showed only the year of experience was associated significantly with good practice. [52] The age and experience years of teachers impacted the practice of teachers positively as they might read, deal, or participating in education program for DM which lead to accumulated of info over the years. Having said that, the practice is essential and important for the teacher to deal with any emergencies associated with DM, and good practice is essential tool to prevent further squally from delay management of such emergencies.

Limitations:

This study has some limitations due to COVID 19 pandemic:
1. The small sample size included in this study.
2. Questionnaire distributed online

CONCLUSION:

We can conclude from this study:
1. The knowledge score was average, attitude was good and practice of teachers regarding diabetes mellitus type 1 student's poor.
2. Internet considered as a major source of information.
3. There were statistical significant association between knowledge level and age, work duration, specialty, qualification, presence of DM students in class, and school DM records.
4. There were statistical significant association between attitude level and age, work duration, qualification, presence of DM students in class, and school DM records.
5. There were statistical significant association between practice level and age, marital status, work duration, presence of DM students in class, and school DM records.

Recommendations:
1. Implant an education program among primary school teachers to increase awareness regarding diabetes mellitus among students.
2. Further studies dealing with this issue in Iraq using larger sample size and another tool of assessment.

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