

Perception and Attitudes of School Teachers about The Preparation of Their Schools for Dealing with Type 1 Diabetic Male Students in Al-Madinah City, Saudi Arabia

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ABSTRACT

Background: teachers should have the knowledge regarding their school's preparations for such complications especially if their school has students with type 1 diabetes mellitus (T1DM) mellitus.

Aim: To assess the perception and attitudes of school teachers about the preparation of their school for dealing with type 1 diabetic students in Al-Madinah City, Saudi Arabia. **Methodology:** A cross-sectional descriptive study was held on 425 Saudi, male teachers working at governmental schools. Cluster sample method was followed. Data were entered and analyzed using SPSS program. **Results:** Most (80.9%) of participants knew that DM is a chronic disease. Only 34.4% knew the normal blood sugar level in children. 48.2% knew that the level of sugar in the blood is important to determine the dose of treatment to be taken. Only 3.1% of teachers reported that the school provide a nurse. 4.5% thought that the nursing room is equipped with essential supplies for emergency and life support. Also, only 4.5% reported that the school have glucagon in the first aid kit. 42.4% were willing to receive training by professionals regarding school measures with children with T1DM. 31.3% were willing to help a student with T1DM.

Conclusion: There is a lack of perception and attitudes among teachers in dealing with diabetic emergency situation in schools and also there is a lack of knowledge regarding the equipment that the school has for dealing with diabetes.

Key words: Al-Madinah; Perception; Saudi Arabia; School teachers; T1 DM.

INTRODUCTION

Diabetes mellitus type 1 (T1DM) is one of the diseases that need frequently monitoring as well as close-up management to avoid its complications. Strict lifestyle modifications such as proper diet control, regular exercise, and daily insulin injections are required to achieve proper glycemic control and thus better outcomes. According to the American Diabetic Association, diabetes mellitus type 1 is a common disease in children and adolescents, and approximately 50%-60% of those with T1DM reported to be under the age of 16 at presentation ⁽¹⁾. A study was released in 2011 by **Habeb et al.**, regarding the incidence of diabetes mellitus type 1 in Al-Madinah, Saudi Arabia between 2004 and 2009 and it concluded that Al-Madinah City had the highest reported incidence of DM type 1 in the Middle East and North Africa Region ⁽²⁾.

In Saudi Arabia, 35,000 children and adolescents suffer from T1DM, which makes it the 8th and 5th rank regarding the prevalence and incidence, respectively ⁽³⁾.

However, one of the most common complications of diabetes mellitus type 1 is hypoglycemia, which is defined as a low blood glucose level <70 mg/dL. A study conducted in Jeddah, Saudi Arabia, regarding the prevalence of type 1 DM in this region, found among 228 children who were included in the study, 157 children (68.9%) had hypoglycemic attacks per year, which is considered high percentage ⁽⁴⁾. Diabetic school students spend most of their time in school away from their parents, so the head principal and school teachers must have the basic perception, attitudes on how to react in a situation when a complication such as hypoglycemic attack happen and have the proper equipment's in the center to use them when required. It's unreasonable to assume that

teachers know everything about diabetes and its specific management, but it is reasonable to assume that they know the basic concept such as signs as well as symptoms of both hyperglycemia and hypoglycemia when they occurred. Moreover, teachers should have the knowledge regarding their school's preparations for such complications especially if their school have students with T1DM mellitus. The Canadian Pediatric Society has released in 2015 the recommendation in managing diabetes type 1 in school to educate school teachers about the principle and basics of managing those patients and had recommends a minimum standard for supervision and care to support DM1 students in schools ⁽⁵⁾.

However, a recent study conducted in 2018 in Spain ⁽⁶⁾, showed that 43.2% of teachers had students with type 1 DM, but only 0.8% had received specific training of diabetes. The study revealed the gap of information among school teachers about diabetes type 1, which can result in major complications of diabetes such as hypoglycemia.

A study reported the incidence rate of diabetes mellitus type 1 in Al-Madinah City, Saudi Arabia ⁽⁷⁾ between 2004 and 2009, there was a significant increase in the incidence of DM type 1; children between 0 to 4 years had an incidence of 17.1 per 100,000. On the other hand, children between 5 to 9 and 10 to 12 the incidence rates were 30,0 and 46.5 per 100,000, respectively.

A study conducted in 2018 in Italy ⁽⁸⁾ to assess the knowledge of school teachers on T1DM mellitus. A total number of 292 teachers were included in the study who completed their questionnaire to assess their knowledge of DM type 1. However, the study concluded that there was a poor sensitivity of the school about diabetes and very

superficial knowledge of the different aspects of diabetes among school teachers.

A study conducted in 2018 in Spain for assessing perception and attitudes of school teachers for the preparation of school to assist diabetic students, a total of 756 teachers included in the study and completed their questionnaire. The result showed that 43.2% of teachers had or previously had students with type 1 DM, and only 0.8% had received specific training on diabetes. Another interesting outcome showed that only 18.9% of teachers mentioned that their students had experienced at least 1 episode of hypoglycemia in school. Moreover, only 6.4% mentioned that the school has glucagon in the first aid kit⁽⁶⁾. Due to the increasing prevalence of DM type 1 worldwide, according to the SEARCH study reported that 1.93 per 1.000 (aged <20 years) were diagnosed with diabetes mellitus type I⁽¹⁰⁾. In 2015, American Diabetes Association (ADA)⁽¹¹⁾ released a position statement in diabetes care in school, the summary of these statements that diabetes should be managed continuously in school, with frequent monitoring of blood glucose throughout the day, as well as educate and train school staff, and children⁽¹¹⁾.

Study rational:

T1DM mellitus is a common disease in Saudi Arabia, specifically in Al-Madinah City. Al-Madinah City has the highest incidence of DM1 in the Middle East and North Africa⁽²⁾. Up to our knowledge, there is a lack of perception and attitudes among teachers in dealing with diabetic emergency situation such as hypoglycemia in schools and also there is a lack of knowledge regarding the equipment that the school has for dealing with diabetes in Saudi Arabia, specifically in Al-Madinah City. Moreover, specific consideration should be taken into account while managing DM1 in children to prevent complications; these considerations are strict glycemic control, healthy diet and moderate physical activity, and immediate management of the complications. However, since children spend most of their days in school, and teachers have an eye on them, it's important to point out that the school teachers should have the basic knowledge, perception, and attitudes about their schools in dealing with DM1 complications such as hypoglycemic attacks among diabetic students. However, if there is a lack of information among the teachers regarding the preparation of their school to assist diabetic students, it's important to establish a program for teachers to address these gaps and to fulfill them with the proper management and practice.

The aim of the study was to assess the perception and attitudes of school teachers about the preparation of their school for dealing with type 1 diabetic students in al-Madinah city, Saudi Arabia.

Methodology:

Study design: Cross-sectional descriptive study.

Study Area: The study was held in AL Madinah City, which is located in the northwest region of Saudi Arabia. The researcher has chosen this area due to different reasons; the first reason that he lived in this area so the data collection was easier for him and reachable. The second reason is there was a study conducted in this area in 2011 regarding the incidence of diabetes mellitus type 1 and it showed that the incidence was the highest in The Middle east. However, it's reasonable to study the perception and attitudes of school teachers regarding the preparation of their school in order to assist students with T1DM mellitus.

Study population: The official Ministry of Education website has released in 2018 statistics regarding the number of students, schools, and teachers in Saudi Arabia. In Al-Madinah Region, there were 724 governmental schools and 48 private schools. There were 373 elementary male schools, 245 intermediate male schools, and 151 secondary male schools. The number of teachers in the elementary, intermediate, and secondary schools are 11696, 7010, and 4248 teachers, respectively⁽¹²⁾.

Inclusion Criteria: Saudi, male teachers working at a governmental school in Al Madinah City.

Exclusion Criteria: Non-Saudi, female teacher, private sector

Study Sample: Using Raosoft sample size calculator, the margin error = 5%, Confidence level= 95%, the population size = 22000, the response distribution = 50%. The population size has been taken from the Ministry Of Education of Saudi Arabia's statistics website. The recommended sample size was 378. However, the sample size was 489 to decrease the 5% margin error to increase the confidence interval (CI).

Sampling technique: Cluster sample method was followed. Al-Madinah City is divided into 4 sectors, north, south, east, and west. The researcher selected the schools randomly from each sector as the following: 125 teachers in north (3 schools), 125 teachers in west (3 schools), 125 teachers in east (3 schools), and 125 teachers (3 schools) in south. The response rate was 85%, so, we get 425 complete questionnaires.

Study tool: The researcher used 2 different questionnaires in this cross-sectional, descriptive study. The 1st questionnaire concerned with the sociodemographic and educational characteristics of the teachers, the data were the followings: Age, the experience of teaching (years), position in school, and any interaction with diabetic student currently or in the past. The 2nd questionnaire was to assess the perception and attitudes of the teachers about their schools in assisting diabetic students type 1 in Al-Madinah, Saudi Arabia, which was adapted from **Laureano et al.**⁽⁶⁾. However, a permission was taken from the author via e-mail.

Data collection technique: The researcher distributed the two questionnaires among the teachers during school time, the teachers should answer the 2 questionnaires in the presence of the researcher to avoid any misunderstanding or confusion from the teachers. However, after the completion of the questionnaires, the data were entered and analyzed.

Data entry and analysis: After finishing the questionnaires, the researcher collected all the data and put them in excel file, then transfer all the data to SPSS program version 24.0 for windows. Data were represented as number and percentage.

Pilot study: A pilot study was held in 10 school teachers in different school levels in Al-Madinah, Saudi Arabia, to determine the clarity of the questionnaire and to test the understanding of it. The reason to do this pilot study was to check if there should be any modification for my collection data tool and edit it before applying the actual study.

Ethical Consideration:

Ethical approval was taken to conduct the study from the Research Ethical Local Committee of Al-Madinah health affairs and an informed written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

RESULTS

The study included 425 participants, 96.9% of them were male teachers. 40.2% of teachers aged between 41- 50 years old and 38.8% aged 30- 40 years old. 75.3% of the studied teachers were married and 12.7% were single. As for experience in the field of education, 60.5% of studied teachers had 10 to 20 years of experience (**Table 1**).

Table (1): Sociodemographic characteristics of participants (n=425)

Parameter	No.	%	
Gender	Male	412	96.9
	Female	13	3.1
Age	Less than 30	17	4.0
	30- 40	165	38.8
	41 – 50	171	40.2
	51 – 60	72	16.9
Marital status	Married	320	75.3
	Single	54	12.7
	Widow	12	2.8
	Divorced	39	9.2
Number of children	0	65	15.3
	1	81	19.1
	2	124	29.2
	3	85	20.0
	4	42	9.9
	5	13	3.1
	6	7	1.6
	7	4	9.
	8	2	5.
	9	2	5.
Number of years of experience in the field of education	Less than 10	64	15.1
	20 – 10	257	60.5
	21–30	104	24.4
Current Position	Director	15	3.5
	Agent	22	5.2
	Teacher	363	85.4
	Guide	23	5.4
	Other	2	0.5
Number of years of practice in the current position	Less than 10	93	21.9
	20 10	267	62.8
	30 21	65	15.3

Of all studied sample, 17.2% had family history of diabetes. 11.3% of teachers were teaching a student with T1DM, 16% at the time of this research and before, 32.7% in the time before this research only, and 24.7% didn't teach such students at all (Table 2 and figure 1).

Table (2): Family history of DM or other chronic diseases and experience of teacher with a diabetic student (n=425)

Parameter		No.	%
Family history with T1DM	Yes	73	17.2
	No	314	73.9
	Don't know	38	8.9
Family history with any other chronic disease	Yes	85	20.0
	No	258	60.7
	Don't know	82	19.3
Teach a student with T1DM	Yes, currently	48	11.3
	Yes, now and in the past	68	16.0
	Yes, in the past but not now	139	32.7
	Neither in the past nor now	105	24.7
	Don't know	65	15.3

59.8% of participants reported never seeing a student with T1DM measuring his blood sugar level. 7.5% and 23.1% more than once or once only reported that a parent of a student with T1DM told them about their child's diabetes care without having to ask them respectively. 9.2% reported seeing a student with T1DM does not feel well more than once. 7.8% experienced a low blood sugar episode of a student with T1DM more than once (Table 3).

Table (3): Participants' experience with a T1DM student (n=425)

	More than once	Once only	Never
Times of seeing a student with T1DM measure their blood sugar level	32 7.5%	139 32.7%	254 59.8%
Times of seeing a student with T1DM use insulin	57 13.4%	87 20.5%	281 66.1%
Times has the parent of a student with T1DM told you about their child's diabetes care without you having to ask them	32 7.5%	98 23.1%	295 69.4%
Times asked the parent of a student with T1DM about diabetes care needed for his child	31 7.3%	98 23.1%	296 69.6%
Times of seeing a student with T1DM does not feel well	39 9.2%	130 30.6%	256 60.2%
Times of experienced a low blood sugar episode of a student with T1DM	33 7.8%	123 28.9%	269 63.3%

80.9% of participants knew that DM is a chronic disease. 65.4% knew that T1DM is diagnosed most frequently during childhood. 49.6% knew that T1DM can have serious complications if not treated appropriately. Only 34.4% knew that normal blood sugar level in children upon awakening is 4-7 mmol/L or equivalent to 0.72-1.20 g/L. 48.2% knew that the level of sugar in the blood is important to determine the dose of treatment to be taken. 44.9% knew that injuries to the skin level are more serious in people with T1DM because the risk of infection is higher. 53.2% knew that the first thing to do is check their blood sugar level if a person with T1DM feels unwell. 46.4% know that eating certain sugary foods or drinks is the first thing to do if a person with T1DM has an episode of hypoglycemia (Table 4).

Table (4): Participants' knowledge of T1DM (n=425)

	Correct	Wrong	Don't know
T1DM is a chronic disease	344 80.9%	38 8.9%	43 10.1%
T1DM is diagnosed most frequently during childhood	278 65.4%	68 16.0%	79 18.6%
T1DM is caused by poor lifestyle, such as lack of physical activity, unhealthy food, pollution, etc	210 49.4%	121 28.5%	94 22.1%
T1DM can have serious complications if not treated appropriately	211 49.6%	95 22.4%	119 28.0%
People with T1DM are advised to regularly measure the level of sugar (glucose) in their blood	218 51.3%	101 23.8%	106 24.9%
The normal blood sugar level in children upon awakening is 4-7 mmol/L or equivalent to 0.72-1.20 g/L	146 34.4%	134 31.5%	145 34.1%
The level of sugar in the blood is important to determine the dose of treatment to be taken	205 48.2%	126 29.6%	94 22.1%
If blood sugar levels are normal for 3 months, diabetes medications can be stopped	162 38.1%	149 35.1%	114 26.8%
People with T1DM only use insulin when complications occur	185 43.5%	144 33.9%	96 22.6%
Insulin use carries a risk of hypoglycemic episodes	197 46.4%	126 29.6%	102 24.0%
People with T1DM must eat more carbohydrates (sugars) because their bodies do not produce the sugar needed for energy	175 41.2%	155 36.5%	95 22.4%
Red meat is a high-carb food	156 36.7%	164 38.6%	105 24.7%
People who take diabetes medications don't need to care about healthy eating	172 40.5%	170 40.0%	83 19.5%
Injuries to the skin level are more serious in people with T1DM because the risk of infection is higher	191 44.9%	149 35.1%	85 20.0%
Intense exercise may cause severe hypoglycemia in patients with T1DM.	208 48.9%	132 31.1%	85 20.0%
There are no warning signs of hypoglycemia	181 42.6%	173 40.7%	71 16.7%
People with T1DM need regular medical exams for their eyesight, kidney function, and nerve function	189 44.5%	151 35.5%	85 20.0%
There are no specific measures for people with T1DM to exercise	199 46.8%	140 32.9%	86 20.2%
If a person with T1DM feels unwell, the first thing to do is check their blood sugar level	226 53.2%	122 28.7%	77 18.1%
If a person with T1DM has an episode of hypoglycemia, they should eat certain sugary foods or drinks	197 46.4%	143 33.6%	85 20.0%

Only 3.1% of teachers reported that the school provide a nurse. 4.5% think that the nursing room is equipped with essential supplies for emergency and life support. 24.9% reported that there are specific precautions adopted in the school to help students with diabetes. 21.6% reported that school staff received special training about diabetes and its management. 40.5% think that students with diabetes participate in all school activities. Only 20.5% think that their school is able to manage diabetes emergency (low or high blood glucose > 3 g/l). Also, only 4.5% reported that the school have glucagon in the first aid kit and 3.5% reported that there is someone responsible for giving glucagon at school (Table 5).

Table (5): Participants' attitude towards T1DM (n=425)

	Yes	No	Don't know
The school provide a nurse	13 3.1%	365 85.9%	47 11.1%
The nursing room is equipped with essential supplies for emergency and life support	19 4.5%	339 79.8%	67 15.8%
There are specific precautions adopted in the school to help students with diabetes	106 24.9%	172 40.5%	147 34.6%
The school staff received special training about diabetes and its management	92 21.6%	219 51.5%	114 26.8%
There is a specific measure for students with T1DM regarding physical education classes	121 28.5%	201 47.3%	103 24.2%
Students with diabetes participate in all school activities	172 40.5%	178 41.9%	75 17.6%
Physical education teachers are able to recognize an episode of hypoglycemia	133 31.3	192 45.2	100 23.5
The school is able to manage diabetes emergency (low or high blood glucose > 3 g/l)	87 20.5%	207 48.7%	131 30.8%
The school have glucagon in the first aid kit	19 4.5%	246 57.9%	160 37.6%
There is someone responsible for giving glucagon at school	15 3.5%	251 59.1%	159 37.4%

As for practice in table (6): 28.5% of the studied sample encouraged the implementation of a project to improve diabetes control during school hours. 42.4% were willing to receive training by professionals regarding school measures with children with T1DM. 31.3% were willing to help a student with T1DM who is feeling unwell until an ambulance or specialist care arrives. 35.5% were willing to receive training by professionals regarding school measures with pupils with other chronic diseases.

Table (6): Participants' practice towards T1DM (n=425)

	Sure	Probably	Rather no	Not sure
Encourage the implementation of a project to improve diabetes control during school hours	121 28.5%	277 65.2%	6 1.4%	21 4.9%
Willing to receive training by professionals regarding school measures with children with T1DM	180 42.4%	181 42.6%	13 3.1%	51 12.0%
Willing to receive training on how to give glucagon to students with T1DM	152 35.8%	183 43.1%	18 4.2%	72 16.9%
Willing to help a student with T1DM who is feeling unwell until an ambulance or specialist care arrives	133 31.3%	224 52.7%	15 3.5%	53 12.5%
Willing to receive training by professionals regarding school measures with pupils with other chronic diseases	151 35.5%	220 51.8%	10 2.4%	44 10.4%

DISCUSSION

In an ideal world, educational settings would have immediate access to supplies to help students with diabetes, as well as personnel trained in diabetes care⁽⁹⁾. Education and support are critical in assisting people to self-manage the disease. Training is an ongoing process that aims to develop the necessary skills, capacities, and knowledge for disease management success⁽¹¹⁾. Despite attempts for providing a safe environment for the care of children with T1DM, unsatisfactory research has been conducted on the level of preparation of educational institutions and teachers' attitudes toward supporting children and adolescents⁽¹³⁾. It is critical to consider whether educational centers are equipped and have qualified personnel to provide care to students with diabetes, so that they can be safe and fully included in the learning process⁽¹⁴⁾.

In our study, 11.3% of teachers were teaching a student with T1DM at the time of answering the questionnaires of the current study, 16% at that time and before, 32.7% in the time before only, and 24.7% didn't teach such students at all. These findings were lower than those reported in a previous study because, while 43.2 percent of the teachers reported having students with DM1 in their classes either, at the time of the study or before, very few of them had received diabetes-specific training (only 0.8 percent of those interviewed)⁽¹³⁾. These findings, highlight the need to improve teachers' knowledge of type 1 diabetes and its management⁽¹⁶⁾.

In our study, 80.9% of participants knew that DM is a chronic disease, 49.6% knew that T1DM can have serious complications if not treated appropriately and only 34.4% knew that normal blood sugar level in children upon awakening is 4-7 mmol/L or equivalent to 0.72-1.20 g/L. A Saudi study in Al-Khobar, Saudi Arabia⁽¹⁵⁾ identified the lack of knowledge of the concept of diabetes and knowledge about hypoglycemic symptoms among female diabetic school teachers, with (25%) of them using specific herbs to treat their DM. A study conducted in Bahrain⁽¹⁶⁾ discovered a lack of knowledge and attitudes among Bahraini schoolteachers. In Riyadh, a study of primary and intermediate school compounds in Riyadh City found that 78% of them had a fair total knowledge level⁽¹⁹⁾. Another study found that teachers' knowledge of diabetes was adequate in many ways, with more than half of them describing themselves as knowledgeable. However, some important aspects of the disease were reported to have a lack of knowledge. Misconceptions were discovered regarding the fasting blood glucose cut-off level for diagnosing diabetes, stroke as a complication of diabetes, and smoking as a risk factor for it⁽²⁰⁾. Adequate general knowledge about diabetes was also reported in a similar Saudi study conducted in the Al-

Jouf region among primary and intermediate school teachers⁽²¹⁾. Due to the use of different tools and cut-off levels in assessing knowledge, comparisons between studies are not applicable⁽²⁰⁾. In Spain, only 36.9 percent of the surveyed teachers had sufficient basic knowledge about diabetes. Nonetheless, other studies strongly advocated for a training program for teachers to improve their diabetes knowledge after observing relatively low levels of knowledge^(23, 24).

In terms of general diabetes knowledge, one of the issues where the majority of the lay public and even health professionals are mistaken is the possibility of diabetics consuming something with sugar. According to our study results, 46.4% knew that eating certain sugary foods or drinks is the first thing to do if a person with T1DM has an episode of hypoglycemia. A study investigating the pre- and post-intervention knowledge, attitude, and practice of teachers towards diabetes discovered that after the interventions, there was a greater number of correct answers in all questions related to this topic, both for students and for school staff, including the questions related to behavior and attitudes in hypoglycemia, which showed the greatest changes⁽²⁵⁾. In this regard, the importance of emphasizing this topic in interventions was confirmed, contextualizing it, as recommended, within a healthy diet and in the case of hypoglycemic crisis correction.

Given that the only initial, approved therapy for severe hypoglycemia is the administration of glucagon, it is critical that institutions have this in their first-aid kits, and appropriate care and supervision of students living with T1DM should be provided, particularly with regard to glucose levels and diabetic emergencies⁽²⁶⁾. In our study, only 4.5% reported that the school have glucagon in the first aid kit and 3.5% reported that there was someone responsible for giving glucagon at school. This was much lower than reported in previous literature. According to a previous study, a high percentage of participants were unaware that the institution had glucagon in their first-aid kit⁽²⁷⁾. Other studies have found that most parents believed there were a limited number of glucagon injections available at school and that the personnel prepared to administer glucagon were inadequately trained⁽²⁸⁻³⁰⁾. According to another study, 10% of teachers did not know what glucagon was used for, and 66% did not know if it could be administered by someone⁽¹³⁾. The absence of equipment required for cooling glucagon in schools, the non-availability of glucagon, and the lack of qualified personnel in schools, combined with an increase in students with T1DM, are viewed as dangerous, because severe hypoglycemia associated with T1DM can lead to convulsions, coma, and, eventually, death. Attitudes of teachers are typically a reflection of their knowledge, beliefs, and perceptions.

In order to provide good care, school teachers must have positive attitudes and be knowledgeable about health issues⁽¹⁹⁾.

As for practice, our study showed that 42.4% of participants were willing to receive training by professionals regarding school measures with children with T1DM. 31.3% were willing to help a student with T1DM who is feeling unwell until an ambulance or specialist care arrives. This was in agreement with a study in Spain, which noted that a significant percentage of young teachers were willing to be trained in T1DM management. Also, many teachers are personally willing to help care of T1DM students despite having received no specific training in the management of the disease⁽²⁷⁾.

CONCLUSION

In conclusion, the study reveals a lack of understanding of DM among Saudi teachers. Unfavorable attitudes toward taking care of diabetes care and education were prevalent. As a result, the study suggests that effective practical in-service diabetes education and training programs about diabetes care procedures and emergency management be employed. It is the duty of educational organizations to offer satisfactory training to school personnel regarding the management and treatment of T1DM. The goals will be to improve the quality of life of students with T1DM by assisting with optimal metabolic control and increasing trust and satisfaction among parents and students in the school environment.

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