**Research Article**

# ASSESSMENT OF THE KNOWLEDGE, ATTITUDE AND MANAGEMENT PRACTICES ON CARE OF CHILDREN WITH TYPE 1 DIABETES MELLITUS AMONG PRIMARY AND INTERMEDIATE SCHOOL TEACHERS IN AL-AHSA CITY, SAUDI ARABIA

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## ABSTRACT

**Introduction:** Type 1 Diabetes Mellitus [T1DM] is considered as one of the most common chronic diseases among children. It is caused by insulin deficiency following the destruction of the insulin-producing pancreatic beta cells. It mostly presented in childhood, but one-fourth of cases diagnosed in adults. School staffs including the teachers' knowledge, attitude and practice about type 1 diabetes play important role in creating awareness about the childhood diabetes and persuading diabetic students to follow physicians advice towards the treatment children attending their school to adhere with the treatment plan advised to them by treating physicians..

**Aim:** This study aimed to assess the knowledge, attitudes, and practice (KAP) of school staffs, administrators, and teachers towards participating in the efforts for managing T1DM and its complications amongst children.

**Materials and methods:** This is a cross-sectional study conducted among school teachers aged between the age 23 and 60 years who live in Al-Ahsa. A self–completed questionnaire was designated that were given to the schools' teachers which comprised of basic demographic data, assessment of diabetic knowledge about signs, symptoms and complication of diabetes and management attitude and practices among school teachers for diabetic student at the school setting. All data analyses were performed using SPSS version 21.

**Results:** The total mean knowledge score was 9.87 (SD 3.03) out of 16 points. Almost sixty four percent of the teachers had good knowledge about the signs, symptoms and management of type 1 diabetes As far as the attitude of the teachers yowrds type 1 diabetic children are concerned, more than fifty eight percent of them had positive attitude. Similarly more than fifty three percent of the teachers had good price towards the type 1 diabetes children. Positive significant correlation was found between knowledge, attitude and practices score (P<0.001). Some of the most notable results in inferential statistics were, increasing age was associated with the increased in knowledge (T=-2.525; P<0.001), attitude (T=-2.509; P=0.006) and practices (T=-2.972; P=0.019) while those who were living in urban were more associated with negative attitude (T=-1.132; P=0.039).

**Conclusion:** Teachers had adequate knowledge, attitude and management practices on care among children with T1DM. Increasing age and previous history of T1DMwerethepredictors of good knowledge, attitude and practices while living in urban was the predictor of negative attitude.

## INTRODUCTION

Diabetes Mellitus (DM) is a growing global health concern. There are several types of diabetes. Type 1 Diabetes Mellitus [T1DM] is considered as one of the most common chronic diseases among children, is caused by insulin deficiency following the destruction of the insulin-producing pancreatic beta cells. It mostly presented in childhood, but one-fourth of cases diagnosed in adults. Type 1 diabetes mellitus is accounting for approximately two-thirds of new diagnoses of diabetes. [1]The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. [2]Population-based surveys conducted in Saudi Arabiaduring2008has shown that the prevalence of type 1 diabetes is 110 per 100.000.[1]Children with type 1 diabetes mellitus must carefully balance insulin, food, exercise, and other factors in order to prevent or minimize severe short and long-term complications due uncontrolled blood sugar level. The management of type 1 diabetes requires management throughout the day especially the time spent in school.

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Good education of school children depends on school teachers' background and knowledge about Diabetes mellitus Apart from parents, school teachers are the primary caregivers to those children and considered to be the first line of protection for school children. Care is provided to this group of the population mainly by two sources: home and school. The schools considered as excellent places in which to promote better health as part of the proposed National Health Strategy. Health behavior adopted in childhood appears to have a strong influence on future health. The school teachers represent the potential first-respondent during Diabetic complications like hypoglycemia or isolated emergencies in the school environment. This study will be designed to assess the diabetic knowledge and caring practice among teacher who has a diabetic student. They will be asked regarding sources of information, and an attempt will be made to judge their interest.

There are many researches around the world to assess the knowledge, attitude and practice of teachers on type 1 diabetes. Bradbury (1983), [3]in his study had foundthat only twenty five of the teacher population seemed to have sufficient understanding of diabetes. There was a few knowledge of recognition and treatment of emergency diabetic complication and aspects of diet. .However in a similar study Immanuel Amissah(2015) found a good knowledge of diabetes among the majority of teachers and most of them reported television and radio as the primary source of information for DM [4].In a recent study doneby AlDuraywish A. A. ( 2017) found that out of 744 teachers who were studied only 75.4 percent of the participants had adequate general knowledge about diabetes, and 16.0% of the participants reported that their schools had trained personnel in diabetes. It was worth noting that awareness for management of hypoglycemia was as high as 84.3 %. Teachers with a diabetic patient in their family showed higher knowledge about diabetes, unlike their counterparts[5].in a large study in which 49 schools were conducted in Bahrain to evaluate knowledge of school teachers about the clinical presentation and complications of diabetes mellitus among school children, the researchers have found a low awareness of the necessary information about diabetes and its management, a situation which could have dangerous consequences for the child and affect his school performance in many ways. Since teachers are considered to be the first line for the protection of children in school, also they ought to be aware of common health problems in order to offer their help and support to the students when needed. [6]A similar result was found in a study conducted by Z.Aycan(2012)to assess knowledge of diabetes among 1054 teachers from three regions of Ankarawhere the researchers have concluded that school teachers had limited knowledge of diabetes.[7]

In Oregon (USA) study(2007) which was aimed to investigate the diabetes knowledge and preparedness among members of the faculty and staff of schools the results showed that 17% of schools did not have a staff member with training about diabetes and that 10% did not have a diabetes management policy.[8]An Egyptian study has found that the level of awareness regarding the awareness of type 1 diabetes among the school teachers were affected by gender, age, level of education, monthly income and the level of knowledge.[9]

## MATERIAL AND METHODS

It was a cross sectional survey conducted on school teachers of Al-Ahsa district of Saudi Arabia. All the teachers of primary and intermediate schools were the study population. Stratified random sampling was done to select the study schools for this study. The study sample was collected from random sampling of the teachers from the selected primary and intermediate schools. The sample size was calculated using the Epi info software. With the total population size of 1771 teachers and for sample calculation we assumed a the percentage KAP score of from previous study between 45 and 50 percent .The calculated size was 318 participants based on a 95% confidence level with additional 10%to compensate missing data. The teachers selected from each school depended on the size of the population serving in Al-Ahsa governorate .The inclusion criteria were all Saudi male teachers from all primary and intermediate public schools. While the teachers suffering from type 1 diabetes were excluded from the study.

A self–completed questionnaire pre tested and specially designed for this study were the schools' teachers. The questionnaires consisted of 4 sections. The section1of the questionnaires consisted of demographic characteristics such as age, place of qualification and duration of occupation of the participants while Section 2 of the questionnaires consisted of 16 questions on the diabetic knowledge on signs, symptoms and complications The correct answer for each question in this section was coded as 1 while the incorrect answer were coded as 0. The total knowledge score has been calculated by adding the 16 questions and a total score range from 0 to 10 (mean: 9.87; SD: 3.03) has been generated, the higher the score the higher the knowledge about the signs, symptoms and complication of T1DM. By using the mean as a cutoff point to determine the level of knowledge, the teachers were classified as having poor knowledge and good knowledge on the score range of 0 to 16points. A good knowledge score range was between 10 to 16 points while lower than 10 was considered as poor knowledge. Section3 of the questionnaires consisted of 10 questions for evaluation of teachers' attitude on care of children with T1DM ,The correct answer for each question was coded as 1 while the incorrect answer were coded as 0. The total attitude score has been calculated by summing up the 10 questions, the higher the score the higher the attitude toward the care of children with T1DM.The total attitude score has a range from 0 – 10 points(mean: 6.62; SD: 2.00) and by using the mean as a cutoff point to determine the level of attitude. Teachers' were classified as having negative attitude by the score range of0 – 6 points, while good knowledge were classified by the score range of 7 – 10 points Section 4 of the questionnaires was aimed to measure teachers' practice on care of children with T1DMwhich consisted of 5 questions. The correct answer for each question was coded as 1 while the incorrect answer was coded as 0. The total practice score has been computed by adding up the 5 questions and a total score range from 0 – 5(mean: 3.47; SD: 1.27) has been generated. Teachers' were classified as having low practice by the score range of0 to 3 points whereas good practice were classified by the score range of 4 to 5 points. Approval of the study was granted from the ethical committee of Al Ahsa Health affair General Directorate. Since the study was conducted in the Primary and intermediate school, an official letter were sent to the head of each school and the Administration of Education in Al-Ahsa Governorate for permission in order to implement the study. Written consent was also taken from the study participants before starting the study.

The data were entered and analyzed by using the statistical package for social sciences, version 21 (SPSS, Chicago, IL,

USA).Descriptive statistics had been presented using counts, proportions (%), mean ± standard deviation whenever appropriate. The comparison between the knowledge, attitude and practices (KAP) score had been performed using Mann Whitney U test or Kruskal Wallis test (Non-parametric test), whenever applicable. A correlation procedure of knowledge, attitude and practice sore were also conducted to determine the linear relationship of each KAP score. A p-value cut off point of 0.05 at 95% CI used to determine statistical significance.

## RESULTS

All the 318 teachers who were selected for study returned the questionnaires after proper answering them making a response rate of 100 percent. The mean age of the participants was 34 years ±9.75(S.D) with a range of 23-60yearsMore than 49% of the participants were in the age group of 41 – 50 years followed by the age group between 31-40 years which constituted thirty five percent of the study sample. More than a half (55.7%) of them were primary school teachers and most of them married (93.1%) and seventy seven percent of them were living in rural area. Majority of them were having bachelor degree (88.7%) with one third of them (33.3%) were teaching literatures. Additionally, approximately 43% of them had 10–20 years of working experience and 41.8% had more than 20 years working as a teacher. The details of the demographic characteristics are shown in table 1.

**Table 1** Socio demographic characteristics of teachers [(n=318)]

| Study variables | N (%) |
|---|---|
| Age group | |
| •23 – 30 years | 19 (06.0%) |
| •31 – 40 years | 112 (35.2%) |
| •41 – 50 years | 157 (49.4%) |
| •51 – 60 years | 30 (09.4%) |
| Grade level of teaching | |
| •Primary school | 177 (55.7%) |
| •Intermediate school | 141 (44.3%) |
| Marital status | |
| •Single | 22 (06.9%) |
| •Married | 296 (93.1%) |
| Living place | |
| •Urban | 73 (23.0%) |
| •Rural | 245 (77.0%) |
| Educational level | |
| •Diploma holder | 19 (06.0%) |
| •Bachelor degree | 282 (88.7%) |
| •Master degree | 17 (05.3%) |
| Educational subjects | |
| •Science | 62 (19.5%) |
| •Literature | 106 (33.3%) |
| •Religions | 63 (19.8%) |
| •Mathematics | 45 (14.2%) |
| •Art | 14 (04.4%) |
| •Sport | 15 (04.7%) |
| •Mixed subjects | 13 (04.1%) |
| Years of experience | |
| •<10 years | 51 (16.0%) |
| •10 – 20 years | 134 (42.1%) |
| •>20 years | 133 (41.8%) |

### Response on knowledge of Type1 diabetes

Among the most notable results, teachers reported a good knowledge for the following statements including "diabetic student have frequent urination" (91.8%), "diabetic student have general tiredness" (85.5%) and "DM can lead to vision problem" (84%). In contrast, they reported poor knowledge for the following statements including; "DM can lead to impotence" (26.4%) and "diabetic student was not associated to joint pain" (29.2%).The details of the response on the knowledge questionnaires is shown in table 2.

**Table 2** School teachers' diabetic knowledge about signs, symptoms and complications [(n=318)]

| Statement | Correct Answer N (%) |
|---|---|
| 1. Does the diabetic student have loss of weight? | 205 (64.5%) |
| 2. Does the diabetic student have general tiredness? | 272 (85.5%) |
| 3. Does the diabetic student have frequent urination? | 292 (91.8%) |
| 4. Does the diabetic student have excessive thirst? | 204 (64.2%) |
| 5. Does the diabetic student have increase body weight? | 179 (56.3%) |
| 6. Does the diabetic student have anorexia? | 135 (42.5%) |
| 7. Does the diabetic student have abdominal pain? | 130 (40.9%) |
| 8. Does the diabetic student have joint pain? | 93 (29.2%) |
| 9. Does the diabetic student have delay wound healing? | 262 (82.4%) |
| 10. Can diabetes lead to vision problem? | 267 (84.0%) |
| 11. Can diabetes lead to kidney problem? | 233 (73.3%) |
| 12. Can diabetes lead to loss of feelings in hands, fingers and feet? | 225 (70.8%) |
| 13. Can diabetes lead to heart problem? | 202 (63.5%) |
| 14. Can diabetes lead to impotence? | 84 (26.4%) |
| 15. Can diabetes lead to irritability and mood changes? | 215 (67.6%) |
| 16. Do you think that the diabetes effect the academic performance? | 142 (44.7%) |

### Response on attitude and Practice towards type1 diabetic students

The most notable results where teachers showed positive attitude included; "Could recommend the presence of school nurse and clinic at school" (91.8%), followed by "Diabetic student should take sweet juice in case of hypoglycemia" (85.8%) and "hunger, tremors and sweating means hypoglycemia in DM student" (85.2%). On the other hand, teachers exhibited negative attitude for the following statements which included "Diabetic student should be allowed to eat sweet in the class" (23%) and "DM student should take sweets or juices before physical activities class" (44.3%). In the assessment of management practices, teachers reported good practices in the following statements including; "insulin is given in a form of injection (89%) and insulin lead to lowering the blood sugar level (80.8%) while poor practices were reported by the teachers on the statement about "having enough information about management of T1DM" (42.5%). The details of the responses of management practice and attitude among school teachers towards diabetic students is shown in table 3.

**Table 3** Management practice and attitude among school teacher for Diabetic student at the school setting according to their information and training [(n=318)]

| Attitude Statement | Correct Answer N (%) |
|---|---|
| 1. Do you think that DM student with T1DM can attend the PA class? | 228 (71.7%) |
| 2. Do you think the DM student should take sweets or juices before PA class? | 141 (44.3%) |
| 3. Do you think the DM student need light snacks and special meal through the school day? | 209 (65.7%) |
| 4. Do you think the DM student should not be allowed to eat sweet in the class? | 73 (23.0%) |
| 5. Do you think that hunger, tremors and sweating means hypoglycemia in DM student? | 271 (85.2%) |
| 6. In case of hypoglycemia, should the diabetic student take sweet juice? | 273 (85.8%) |
| 7. In case of coma, can small amount of jam or honey be put into the mouth of the DM student? | 223 (70.1%) |

| | |
|---|---|
| 8. Do you have fears regarding having child with T1DM in the class? | 142 (44.7%) |
| 9. Do you wish to attend training course for dealing with DM student? | 252 (79.2%) |
| 10. Do you recommend the presence of school nurse and clinic? | 292 (91.8%) |
| **Practice Statement** | |
| 1. Do you have enough information about management of T1DM? | 135 (42.5%) |
| 2. Do you know that the insulin is the medication use to manage DM student with T1DM? | 247 (77.7%) |
| 3. Do you think the insulin lead to lowering the blood sugar level? | 257 (80.8%) |
| 4. Do you know that insulin is given in a form of injection? | 283 (89.0%) |
| 5. Do you know how to use the glucometer machine? | 182 (57.2%) |

## *KAP Score*

The overall mean knowledge score was 9.87 (SD 3.03) out of 16 points. Almost sixty four percent of the participants (63.8%) had good knowledge. With regards to attitude, the overall mean attitude score was 6.62 (SD 2.00) out of 10 points .Almost forty two percent of the participants were having negative attitude towards the Typ1 diabetic children.

In the assessment of practice, the mean practice score was 3.47 (SD 1.27) out of 5 points. Poorpractices were found among 46.9% and good practices were found among 53.1% of teachers. The details of KAP score is shown in table 4.

**Table 4** Prevalence of knowledge, attitude and management practices toward T1DM students [(n=318)]

| KAP Parameters | N (%) |
|---|---|
| Knowledge Score (mean ± SD) | 9.87 ± 3.03 |
| Level of knowledge | |
| •Poor | 115 (36.2%) |
| •Good | 203 (63.8%) |
| Attitude Score (mean ± SD) | 6.62 ± 2.00 |
| Level of attitude | |
| •Negative | 133 (41.8%) |
| •Positive | 185 (58.2%) |
| Practices Score (mean ± SD) | 3.47 ± 1.27 |
| Level of practices | |
| •Poor | 149 (46.9%) |
| •Good | 169 (53.1%) |

The most commonly known sources of information was internet/social media (43.4%), followed by family history of T1DM (38.7%) and TV/radio (34.3%) while the least of them was previous history of T1DM (6.6%) (Figure 1).
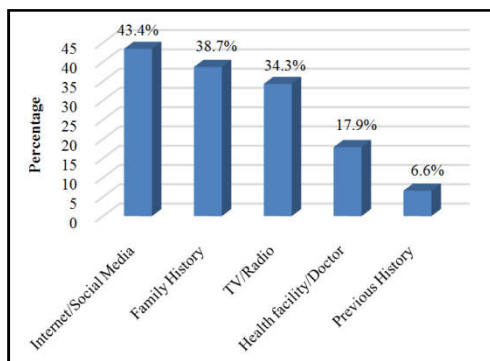


**Figure 1** Sources of information about DM type 1

Based on the results, a positive significantly correlation were found between knowledge and attitude score (r=0.490; P<0.001) suggesting that while the knowledge score increased the attitude will also likely to increase. The correlation between knowledge and practices score were found to be positively statistically significant (r=0.359; P<0.001) indicating that the increased of knowledge was correlated with the increased of practice. Similarly the correlation between attitude and practices score was found to be positively statically significant (r=0.472; P<0.001) denoting that while the attitude increased the practices will also likely to increase.

When comparing the knowledge, attitude and practices score among the socio demographic characteristics of teachers, it was found that increasing age were associated with the increased of knowledge (T=-2.525; P<0.001), attitude (P=0.006) and practices (P=0.019). We also found out that those who were living in urban were negatively affected the attitude (T=-1.132; P=0.039). Furthermore, those who reported TV/radio as a sources of information for T1DM had significantly better in knowledge (T=3.114; P=0.001) and attitude (T=1.170; P=0.030) while those with source of information as a health facility/doctor were significantly more of having knowledge (T=2.941; P=0.002) and practices (T=3.039; P<0.001) whereas those who had source of information with previous history of T1DM were significantly higher in knowledge (T=2.994; P=0.003), attitude (T=2.161; P=0.016) and practices (T=1.439; P=0.041).The details of the comparison between knowledge, attitude and practices score among the socio demographic characteristics of teachers is shown in table 5.

**Table 5** Comparison between knowledge, attitude and practices score among the Socio demographic characteristics of teachers [(n=318)]

| Factor | Knowledge Total Score (16) Mean ± SD | Attitude Total Score (10) Mean ± SD | Practices Total Score (5) Mean ± SD |
|---|---|---|---|
| Age group [a] | | | |
| •≤40 years | 9.37 ± 2.73 | 6.28 ± 2.01 | 3.22 ± 1.45 |
| •>40 years | 10.2 ± 3.18 | 6.85 ± 1.97 | 3.65 ± 1.09 |
| *T-test; P-value* | *-2.525;<0.001 \*\** | *-2.509; 0.006 \*\** | *-2.972; 0.019 \*\** |
| Grade level of teaching [a] | | | |
| •Primary school | 9.86 ± 3.07 | 6.76 ± 2.01 | 3.47 ± 1.29 |
| •Intermediate school | 9.89 ± 2.98 | 6.43 ± 1.98 | 3.47 ± 1.26 |
| *T-test; P-value* | *-0.065; 0.969* | *1.463; 0.096* | *0.045; 0.938* |
| Marital status [a] | | | |
| •Single | 10.0 ± 2.10 | 6.23 ± 2.51 | 3.18 ± 1.65 |
| •Married | 9.86 ± 3.09 | 6.65 ± 1.96 | 3.49 ± 1.24 |
| *T-test; P-value* | *0.275; 0.920* | *-0.944; 0.674* | *-1.108; 0.645* |
| Living place [a] | | | |
| •Urban | 9.81 ± 2.75 | 6.38 ± 1.68 | 3.31 ± 1.37 |
| •Rural | 9.89 ± 3.11 | 6.69 ± 2.09 | 3.52 ± 1.24 |
| *T-test; P-value* | *-0.212; 0.491* | *-1.132; 0.039 \*\** | *-1.199; 0.318* |
| Educational level [b] | | | |
| •Diploma holder | 8.95 ± 4.17 | 5.74 ± 3.23 | 3.16 ± 1.71 |
| •Bachelor degree | 9.93 ± 2.94 | 6.69 ± 1.89 | 3.52 ± 1.19 |
| •Master degree | 9.94 ± 2.95 | 6.24 ± 2.02 | 2.94 ± 1.85 |
| *F-Test; P-value* | *0.947; 0.615* | *2.399; 0.444* | *2.320; 0.518* |
| Educational subjects [b] | | | |
| •Science | 10.0 ± 3.28 | 6.52 ± 2.30 | 3.31 ± 1.36 |
| •Literature | 9.89 ± 2.63 | 6.84 ± 1.57 | 3.59 ± 1.22 |
| •Religions | 9.42 ± 3.51 | 6.38 ± 2.31 | 3.51 ± 1.24 |
| •Mathematics | 10.4 ± 2.65 | 6.49 ± 1.79 | 3.31 ± 1.12 |
| •Art | 9.57 ± 3.78 | 6.00 ± 2.45 | 3.29 ± 1.33 |
| •Sport | 10.6 ± 2.64 | 7.67 ± 2.02 | 3.93 ± 1.16 |
| •Mixed subjects | 9.08 ± 3.20 | 6.31 ± 2.02 | 3.31 ± 1.84 |
| *F-Test; P-value* | *0.767; 0.597* | *1.391; 0.210* | *0.879; 0.478* |
| Years of experience [b] | | | |
| •<10 years | 9.90 ± 2.68 | 6.75 ± 1.51 | 3.49 ± 1.17 |
| •10 – 20 years | 9.97 ± 2.88 | 6.53 ± 1.89 | 3.45 ± 1.39 |
| •>20 years | 9.77 ± 3.31 | 6.65 ± 2.27 | 3.49 ± 1.19 |
| *F-Test; P-value* | *0.152; 0.955* | *0.253; 0.497* | *0.041; 0.980* |
| Sources of information \* | | | |
| •TV/Radio | 10.6 ± 2.78 | 6.79 ± 2.19 | 3.58 ± 1.29 |
| *T-test; P-value* | *3.114; 0.001 \*\** | *1.170; 0.030 \*\** | *1.076; 0.205* |
| •Health facility/Doctor | 10.9 ± 2.85 | 6.96 ± 1.59 | 3.93 ± 1.33 |

| | | | |
|---|---|---|---|
| *T-test; P-value* | *2.941; 0.002 ** | *1.453; 0.256* | *3.039; <0.001 ** |
| • Family history | 9.68 ± 3.15 | 6.63 ± 1.89 | 3.62 ± 1.19 |
| *T-test; P-value* | *-0.895; 0.516* | *0.068; 0.920* | *1.631; 0.130* |
| • Previous history | 11.8 ± 1.89 | 7.52 ± 1.57 | 3.86 ± 1.56 |
| *T-test; P-value* | *2.994; 0.003 ** | *2.161; 0.016 ** | *1.439; 0.041 ** |
| • Internet/Social media | 10.2 ± 2.88 | 6.78 ± 1.81 | 3.44 ± 1.18 |
| *T-test; P-value* | *1.474; 0.134* | *1.241; 0.414* | *-0.364; 0.409* |

\* Variable with multiple responses.
[a]P-value has been calculated using Mann Whitney U test; [b]P-value has been calculated using Kruskal Wallis test.
\*\* Significant at p<0.05 level.

## DISCUSSION

The purpose of this study was to determine the knowledge, attitude and management practices of teacher on care about children with T1DM. The knowledge regarding the signs, symptoms and complications of T1DM was found to be good among 63.8% of teachers in our study. The knowledge of teachers in our study was consistent with the study done in other part of Saudi Arabia[5],Bahrain[6] and Turkey[7]where the the knowledge about type 1 diabetes was good  However the same was not true in studies done in some other part of Saudi Arabia[10], UK[11] and Spain[12],where researchers have found insufficient knowledge of type 1 diabetes among the teacher population.

In the assessment of specific knowledge toward the signs, symptoms and complication of T1DM, some of our most notable results where the teachers exemplified better knowledge were; frequent urination of diabetic students (91.8%), general tiredness of DM students (85.5%) and vision problem due to DM (84%). However, teachers reported weak knowledge in the following contexts such as; DM can lead to impotence (26.4%) and joint pain was not associated with DM (29.2%).It  Increasing age and sources of information of teachers such as; TV/radio, health facility/doctor and previous history of T1DM were significantly more associated with the increased of knowledge level while gender, marital status, educational level, educational subjects and years of experience did not significantly influence the level of knowledge in our study. However in a similar study in Saudi Arabia, the researchers  have found that good level of knowledge was associated with male teachers. Furthermore, a significantly higher knowledge score was also associated with age group 26 – 35, 5 – 10 years of experience, being non-Saudi and university degree.[10] However, in the Egyptian study[9]  the researchers  observed that age, gender, level of education and monthly income significantly affected the level of knowledge. Just like knowledge, the attitude toward the care of students with T1DM was found to be positive among 58.2% of teachers More than fifty percent of the teachers in our study showed positive attitude concerning the care in students with T1DM.Similar result was published by other study of Saudi Arabia[13], Bahrain[6] and Turkey[7].Increasing age and TV/Radio  were more associated with positive attitude while living in urban was more associated with negative attitude. On the other hand, we have found that years of experience did not significantly influence the level of attitude which was not consistent with the  study done in other part of Saudi Arabia[13] where the researchers  reported that there were statistically significant differences in the attitude scale of diabetes for the five experience in years categories.

For the assessment of management practices on care toward T1DM patients 53.1% of the teachers had good practice in our study. More or less same result was found in a study conducted in other region of Saudi Arabia where the researchers  found that good practice had been reported by 40.3% of respondents, 27.1% were very good, 3.6% were excellent and 29% were insufficient.[10] In the assessment of specific practices, we found that teachers reported good practices for the following indicators such as; "Insulin is given in a form of injection (89%) and insulin lead to lowering the blood sugar level (80.8%) while poor practices were reported by the teachers on the statement about "having enough information about management of T1DM" (42.5%). When evaluating the significant factors associated with the level of practices, we have found that  increasing age, health facility/doctor, previous history of T1DM were more associated with better practices. Age was also a factor of practices in a study which done by Al Bahlool[10], where he indicated that age group 26 – 35 were more associated with better practices. Furthermore, he also noted that females, university degree, being Arabic teacher and being teacher in grade 5 – 6 were also significantly associated with better practices which did not coincide with our reports as these factors did not significantly influence in the level of practices.

The sources of diabetic information are necessary among school teachers since they are in charge of the students with T1DM while at school. Interestingly, in this study, the most commonly known sources of diabetic information were internet or social media (43.4%), followed by family history of T1DM (38.7%) and TV or radio (34.3%). Only 17.9% of teachers reported that they source of information were coming from a doctor. Internet was also the main source of diabetic education in the study done in other part of Saudi Arabia, [10] which was consistent with our report. On the other hand, reports indicated by other Saudi study[5],Bahrain[6] and Turkey[7] studies  showed that diabetic information were already part of teachers' general knowledge while the paper of Almalki et al.[4]of Saudi Arabia accounted physician as the most commonly mentioned sources of diabetic information among 79.1% of participants whereas UK study[11] noted that family member and health professionals were the teachers major sources of diabetic information which did not coincide with our reports.

## CONCLUSION

Teachers had adequate knowledge, attitude and management practices on care among children with T1DM. Increasing age and previous history of T1DM were the predictors of good knowledge, attitude and practices while living in urban was the predictor of negative attitude. Although, the KAP of teachers regarding T1DM was found to be sufficient, some indicators had shown gaps most specifically in the signs, symptoms and complications of diabetes. In this regard, more education and training in implementation of diabetes programs aimed at primary and intermediate school teachers, as these programs are a crucial element in better care and control of the disease in the environment of school.

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