Knowledge and Reported Practice about Type 1 Diabetes Mellitus among Preparatory Schools Students at Aswan City, Upper Egypt.

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Abstract

Background: Type 1 Diabetes (T1D) is one of the most common chronic illnesses affecting school-age children. If not appropriately managed, T1D can drastically affect a student's ability to experience academic success. Diabetes self-care is particularly challenging for children. Aim: To assess preparatory school students' knowledge and reported practices about type1 diabetes mellitus. **Design:** A cross sectional research. **Setting:** the study was conducted in preparatory schools, the Aswan City. **Subjects:** purposive sample of 99 students diagnosed with diabetes. **Tool (I):** Structured interviewing questionnaire include 2 parts: **First part:** Personal characteristics of students and their parents, and medical history of diabetic students. **Second part:** Students' knowledge about DM. **Tool (II):** Reported check list for students' regarding diabetic self-care practice. **Results:** More than half of students had good knowledge about diabetic self-care. **Conclusion:** study confirmed that there was positive correlation between knowledge and reported practices scores with highly statistical significant association. **Recommendations:** Health education programs and training courses should be developed and implemented for students to increase their awareness, attitude and practice about diabetes mellitus.

Keywords: Knowledge, Reported practice, Type 1 Diabetes Mellitus and Preparatory School Students.

Introduction

Diabetes is one of the most overall wellbeing troubles with an expansion in diabetes occurrence in kids and adolescents. Type 1 Diabetes Miletus (T1DM) is one of the most difficult non-communicable diseases to treat in children and is a global health issue. Diabetes self-care is particularly challenging for children (Patterson et al., 2019).

T1DM is the second most common chronic disease in children, and its prevalence has risen by 3% per year globally in recent decades. Furthermore, 75% of all DM1 cases diagnosed are in people under the age of 18 years (Abd El Salam et al., 2023).

This chronic disease necessitates the patient's active participation in treatment, including self-management of symptoms, lifestyle changes, coping with physical and psychosocial consequences, and managing tasks related to insulin self-administration, blood glucose self-monitoring and nutritional and exercise management (Caruso et al., 2019). These tasks are deemed too difficult and time-consuming for young children to complete

without the assistance of parents/caregivers (Goethals et al., 2020).

Insulin is a hormone required to allow the body's cells to use glucose, so without insulin, glucose remains in the bloodstream where it does not produce energy for the functioning of the body. Due to the lack of endogenous insulin production, exogenous insulin must be administered to maintain the body's metabolic function (Wherrett et al., 2018).

Diabetes Mellitus is a metabolic disease, involving inappropriately elevated blood glucose levels. DM has several categories, including type 1, type 2, Maturity-Onset Diabetes of the Young (MODY), gestational Diabetes, neonatal Diabetes, and secondary causes due to endocrinopathies, steroid use (Yahaya & Ufuoma, 2020).

The primary goal of diabetes management and treatment is to prevent or delay complications and maximize quality of life. Nurses should be aware of recent advances in the management of diabetes in adolescents, their associated complications, and technological advances. Nurses use an appropriate approach in caring for children with diabetes to improve adherence to the treatment recommendations of health professionals and to help children become more informed about their diabetes care (Bakalis et al., 2018 & Weinstock et al., 2020).

Self-care is defined as the actions people take on their own behalf to maintain life, health and well-being. With chronic illnesses, self-care can be described as the health-related activities required to live an everyday life with a disease. diabetes self-care Flexible depends on knowledge, physical skills and the ability to handle diabetes-related emotional aspects. Diabetes self-care is a prerequisite for good metabolic control, which enables normal growth and development. Moreover. maintaining good control promotes better overall health and reduces the risk of long-term complications (Elsobky et al., 2022).

Self-care is crucial in diabetes to keep the illness under control. Diabetes self-care activities in children and young adults were very compliant with taking medication but were only moderately compliant to diet and selfglucose monitoring and least compliant to exercise. Besides, people affected with the disease often have inadequate knowledge about the nature of diabetes, its risk factors and associated complications. This lack of awareness may be the underlying factor affecting attitudes and practices towards its care (Lee et al., 2019).

The daily self-management of children and adolescents with type 1 diabetes is complex and dynamic, requires frequent self-monitoring of blood glucose (SMBG), insulin injections, and individual meal plans. However, changes in daily schedules (e.g., recess, physical education class, school outings, and participation in sports) or an acute illness complicate children's blood glucose management while at school **(Edraki et al., 2020).**

School health nurse is a strategic position in this specialized health care team because children spend long periods of time in their schools. So, she is the base stone in all aspect of diabetes management by assessing the students' needs and issues, giving suitable care, aiding diabetic adolescents and their families to deal with diabetes, keeping normal growth and development, attaining the most effective doable diabetes control and preventing complications (Majeed et al., 2022).

The role of the nurse in educating T1DM children in self-care is essential. Patient education of self-care and the enhancement of the role of nurses in diabetes care leads to improvements in patient outcomes and the process of care. Nurses' responsibilities are numerous, educating the children to the best of ability to understand condition in such a way that know enough about management and self-care in order to change lifestyle (Wilt, 2022).

Significance of the study:

Inadequate diabetic self-management remains a big drawback facing health care providers and populations in all settings.T1DM onset is usually before 30 years old, and it is estimated that today 1.1 million children and adolescents worldwide live with T1DM (Datye et al., 2019).

The rate is increasing by around 3% every year. In Eastern Mediterranean and Middle Eastern countries, the largest contribution to the total number of childhood T1D comes from Egypt, accounting for about a quarter of the region's total. The incidence varies between 1/100000 per year (Pakistan) and 8/100 000 per year (Egypt) in children under the age of 15 years (Montalie et al., 2022).

Aim of the study

This study aimed to assess knowledge and reported practice of preparatory school students about type1 diabetes.

Research questions

1. What's the current level of knowledge and reported practices among preparatory school students' regarding T1DM?

Subject and Methods

Research design:

A cross sectional design was used in this study.

Setting:

The study was conducted in preparatory schools, in Aswan City.

Subjects:

The current study recruited 99 students diagnosed with diabetes sampling technique: A purposive sample of 99 students was used. The researchers selected the students based on the following:-

Inclusion criteria: students who had previous history of T1DM, and agreed to participate in the study.

Exclusion criteria: students who diagnosed with critical illness and psychiatric disorders.

Data collection tools:

Two tools were used:

- **Tool I: Interview questionnaire form** it was designed by the researcher. It was included four parts;
- Part (1): Personal characteristics of students as (age, gender, residence, school grade, birth order, number of child sibling).
- **Part (2):** Personal characteristics of their parents: (age, educational level, occupation, parent's consanguinity, and if parents have diabetes).
- Part (3): Medical history of diabetic student; - it include (time of discovery of the disease, how did the child know the disease, starting treatment, type of insulin that used, units, route of injection, regularity and time of insulin taking, student inject yourself, number of admission to the hospital, monitoring glucose by urine analysis)

Part (4): Students' Knowledge about T1DM:

It was adopted from (Särnblad et al., 2016) and included 23 MCQ questions. Divided into five levels; general questions for diabetes (5 items), questions for proper nutrition's for diabetic patients (4 items), questions for exercise (4 items), Foot care questions (8 items) and follow-up questions (2 items).

Scoring system of Knowledge:

The overall score of Knowledge was 23 marks. The score for each answer was given '1'score for correct and '0' for incorrect answer and don't know. The total score of students' knowledge level was classified into Poor knowledge if the score < 50%, Fair knowledge if the score equals 50 to 75% and Good knowledge if the score more than 75% (Ibrahim et al 2024).

Tool II: Checklists of reported practices about diabetic self-Care: It is adapted from (Wilson and Hockenberry, 2014). It consists of (71 items) and divided into four levels. insulin injection by syringe (24 items), insulin injection by pen (13), Performance of blood glucose testing (17 items), and foot care (17 items).

Scoring system of reported practice:

The total score was 71 marks; each statement was assigned a score according to student's response were mark for each statement. A score of '1' was given for "done" practice, while '0' was given for "not done". The scores of items were summed up and then converted into percentage scores, as the following:

- Satisfactory of self-care practices when the total score > 60.0%
- Unsatisfactory of self-care practices when the total score is $\leq 60.0\%$ (Saad et al (2022).

Validity reliability of study tools:

- Validity: Face validity was done by five specialists who evaluated the tools for clarity, relevance, comprehensiveness, and understanding (three in community health nursing, one in medical surgical nursing and one in community medicine, Assiut University).
- **Reliability** and internal consistency for the used questionnaire were calculated. The values of calculated Cronbach's Alpha reliability were as follows 0.77 for knowledge and 0.83 for reported practice about TIDM.

Preparatory phase

It included reviewing of the scientific literature to develop questionnaire for data

collection. An official approval from Central Agency for Public Mobilization and Statistics, Egypt (CAPMAS) and Ministry of Education were obtained for carrying out study in preparatory schools at Aswan City.

Pilot study:

Pilot study was carried out before starting data collection on 10% of total calculated sample (10 students). The time of pilot study collected in February 2023, the aim of this study was to test the clarity of tools and estimate the required time to fill the questionnaire. Based on the result of a pilot study, no modification in the tool was done, so that it included in the study.

Field work:

Data collection started from the middle of February, 2023 to the end June, 2023 in selected schools. Data was calculated in two days/ week from 8 A.M to 2 P.M, and six questionnaires were collected daily. Filling of the questionnaire was taken from 45-60 minutes.

Ethical consideration

Research proposal was approved from the Ethical Committee in the Faculty of Nursing-Assuit University; there is no risk for the studied students during the application of the research. The study followed the common ethical principles in clinical research. Verbal consent was informed from all studied students before the study enrollment. Explanation of the nature and purpose of the study. They have the right to refuse to participate and or withdraw from the study without any rationale at any time. Privacy and confidentiality of participant were ensured.

Statistical analysis:

Data were categorized, coded and analyzed according to appropriate statistical methods and tests then results were presented in suitable tables, figures, and graphics. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20) software for analysis. Quantitative data were presented as mean and standard deviation (SD) while qualitative data were expressed as frequency and percentage. The observed differences and associations were considered statistically significant when $P \le 0.05$.

Results

Shows distribution Table (1): of preparatory school students according to their personal characteristics. It was cleared that 51.5% of the studied students were males and aged from 13 to 15 years with mean \pm SD 13.57±2.83 years. Regarding their residence, the majority 92.9% of them are living in urban areas. As regards the school grades, nearly twofifths of them 39.4% were at the third level of the preparatory school. Moreover, 39.4 % of them had 3 to 4 siblings and 36.9% of them were the oldest of their brothers.

Table (2): shows the distribution of the studied students regarding to their parents education and occupation, it was demonstrated that (45.5%) of fathers' students were age between 40 to 50 years old. (62.5%& 51.5%) of them had secondary education and government employee respectively. For mother data, 63.6% of them were age less than 40 years old, 47.5% had secondary or diploma and 75.8% were housewife. Moreover, (39.4%) of parents have relation between them and (45.5%) of them reported their parents have diabetes.

Table (3) shows the distribution of total knowledge score of the studied preparatory school students regarding diabetic, it demonstrates that (54.5%) of the studied students had a good knowledge about diabetes. The majority (82.8%) of them had a good knowledge about nutrition. Also 56.6% of them had a good general knowledge 51.5% about exercise 55.6% foot care and 53.5% follow-up.

Figure (1) shows the sources of preparatory school students knowledge regarding diabetes .Illustrates that health care providers were the main source of information about TIDM among preparatory school students in Upper Egypt.

Figure (2) shows the total reported practice scores of the studied preparatory school students regarding diabetic self – care . Portrays that more than one third (38.4%) of the studied students had satisfactory practice. While slightly two thirds (61.6%) of them had unsatisfactory practice.

 Table (4) show that the relation between

 personal data of the studied students and their

total level of knowledge. It indicates that there is a highly significant difference (P <0.001) in the relationship between the age and school grade of the studied students and their total knowledge. The data indicates that there is no statistically significant difference in the relationship between the total knowledge of the students under study and their gender, place of residence, order between brothers, and number of siblings (p > 0.05).

Table (5): show that the relation between personal data of the studied students and their total level of reported practice, there is a highly statistical significant difference association between the studied students' total practice and their age and school grade with (P <0.001). Moreover, there is a statistically significant difference association between the studied students' total practice and their number of siblings with (p =.042). While it shows that there is no statistically significant difference association between the studied students' total practice and their gender, residence and order between brothers with (p > 0.05).

Table (6): Shows correlation between knowledge and practice score toward typel diabetes mellitus among preparatory school students. Portrays that was weak positive correlation between Knowledge and reported Practice scores with highly statistical significant association (P < 0.001).

 Table (1): Distribution of preparatory school students of personal characteristic at Aswan City, Upper Egypt 2023 (n=99).

Socio-demographic data	N (99)	%	
Age (years)			
≤15	84	84.8	
>15	15	15.2	
Mean \pm SD (Range)	13.57 ± 2.83	(12.5-16)	
Gender			
Male	51	51.5	
Female	48	48.5	
Residence			
Urban	92	92.9	
Rural	7	7.1	
School Grade			
First year	27	27.3	
Second year	33	33.3	
Third year	39	39.4	
Birth Order			
First	39	39.4	
Second	30	30.3	
Third	18	18.2	
Fourth	12	12.1	
Number of siblings			
1-2	36	36.4	
3-4	39	39.4	
≥5	24	24.2	

 Table (2): Distribution of the studied students regarding to their parents' education and occupation at Aswan City, Upper Egypt 2023 (No=99).

Parents' data	N	%
Father's Age		
<40	30	30.3
40 - 50	45	45.5
> 50	24	24.2
Father's Education	· · ·	
Illiterate / Read and write	6	6.2
Basic education	6	6.1
Secondary/ intermediate	62	62.5
University/ post graduate	25	25.2
Father's Occupation		
Unskilled work	14	14.1
Skilled	10	10.1
Employee	51	51.5
Professional	15	15.2
Retired	6	6.1
Died	3	3.0
Mother's Age	· ·	
< 40	63	63.6
40 - 60	24	24.2
> 60	12	12.1
Mother's Education		•
- Illiterate / Read and write	3	3.0
- Basic education	12	12.1
- Secondary / intermediate	47	47.5
University / Postgraduate	37	37.4
Mother's Occupation		
- Housewife	75	75.8
- Employee	24	24.2
Parents' consanguinity.		
Yes	39	39.4
No	60	60.6
Previous family history of DM		
Yes	45	45.5
No	54	54.5

 Table (3): Distribution of Total knowledge score of the studied preparatory school students regarding diabetic at Aswan City, Upper Egypt 2023(n=99).

Level of knowledge about	Po	Fair		Good		
diabetes	N	%	N	%	N	%
- General Knowledge	17	17.2	26	26.3	56	56.5
- Nutrition	2	2.0	15	15.2	82	82.8
- Exercise	19	19.2	29	29.3	51	51.5
- Foot care	12	12.1	32	32.3	55	55.6
- Follow – Up	14	14.1	32	32.3	53	53.5
Total Knowledge Score	15	15.2	30	30.3	54	54.5









Figure (2): Total reported practice scores of the studied preparatory school students regarding diabetes self- care at Aswan City, Upper Egypt 2023(n=99).

Knowledge at Aswain City, Opper Egypt 2023 (No-99).							
Socio – demographic	Good Knowledge (n=54)		Fair Knowledge (n=30)		Poor Knowledge (n=15)		Р
	N	%	N	%	N	%	
Age (years)							<0.001**
<13	6	11.1	18	60.0	9	60.0	
13 – 15	33	61.1	12	40.0	6	40.0	
> 15	15	27.8	0	0.0	0	0.0	
Gender							0.305
- Male	24	44.4	18	60.0	9	60.0	
- Female	30	55.6	12	40.0	6	40.0	
Residence				_			0.092
- Urban	52	96.3	28	93.3	12	80.0	
- Rural	2	3.7	2	6.7	3	20.0	
School Grade							<0.001**
- First	6	11.1	6	20.0	15	100.0	
- Second	12	22.2	21	70.0	0	0.0	
- Third	36	66.7	3	10.0	0	0.0	
Birth Order							0.234
- First	18	33.3	15	50.0	6	40.0	
- Second	18	33.3	6	20.0	6	40.0	
- Third	12	22.2	3	10.0	3	20.0	
- Fourth	6	11.1	6	20.0	0	0.0	
Number of siblings						0.103	
1 - 2	24	44.4	6	20.0	6	40.0	
3-4	21	38.9	12	40.0	6	40.0	
> 5	9	16.7	12	40.0	3	20.0	

 Table (4): Relation between personal data of the studied students and their total level of knowledge at Aswan City, Upper Egypt 2023 (No=99).

 Table (5): Relation between personal data of students and their total level of reported practice at Aswan City, Upper Egypt 2023 (No=99).

Sasia damagnaphia	Satisfactory practice (n=38)		Unsatisfactor	Р		
Socio- demographic	Ν	%	Ν	%		
Age (years)						
- <13	20	52.6	13	21.3		
- 13 - 15	18	47.4	33	54.1	< 0.001**	
-≥15	0	0.0	15	24.6		
	_	Gender				
- Male	22	57.9	29	47.5	0.316	
- Female	16	42.1	32	52.5		
		Residence				
- Urban	35	92.1	57	93.4		
- Rural	3	7.9	4	6.6		
School Grade						
- First	19	50.0	8	13.1		
- Second	14	36.8	19	31.1	<0.001**	
- Third	5	13.2	34	55.7		
Birth Order						
- First	12	31.6	27	44.3		
- Second	10	26.3	20	32.8	0.228	
- Third	9	23.7	9	14.8		
- Fourth	7	18.4	5	8.2		
Number of siblings						
1-2	8	21.1	28	45.9	0.042*	
3-4	18	47.4	21	34.4		
≥5	12	31.6	12	19.7		

 Table (6): Correlation between diabetic knowledge and practice score toward type I diabetes mellitus among preparatory school students at Aswan City, Upper Egypt 2023.

	Diabetic Knowledge score			
Variable	R	p. value		
diabetic self - care Practice score	0.285	<0.001**		

*Statistically significant differences (P < 0.05).

Discussion

T1DM is one of the most frequent persistent illness in children but can have its onset at any age. is more common than youth-onset T1DM (Leslie et al., 2021). The incidence and prevalence of T1DM, which affects 5% to 10% of all diabetics, have been steadily rising. According to a comprehensive review and meta-analysis, there were 15 cases of T1DM for every 100,000 individuals worldwide, or 9.5% prevalence Mobasseri et al. (2020). In Egypt 8/100000 of the children under the age of 15 year's (Montalie et al., 2022).

Effective self-care skills and practice in pediatric and adolescent diabetic patients encompasses the collection of advanced modalities and is best achieved by engaging in high quality structured education (Mbuagbaw et al., 2021). Therefore, this research aimed to assess self-care knowledge and practice among preparatory diabetic school students at Aswan City.

Regarding personal data features of the students, this study demonstrated that more than half of them were males. The result was in line with Fabrizi et al. (2022) and Al-nasrawi & Aljebory (2023). Whose study reported that more than half of the studied subjects were males. From the research investigator point of view, this could be due to biological factors that predispose males to diabetes at a higher rate compared to females within this specific age group. Hormonal differences, genetic predispositions, or lifestyle factors might contribute to this disparity.

In additions, the findings of this study indicated that more than half of the students were between the ages of 13 and 15 years, their mean age \pm SD was 13.57 \pm 2.83 years. According to a study that **Salah Eldin & Abdel Malek (2023)** adopted, the majority of the children in the study were between the ages of 12 and under 14 years old, with a mean age of 12.84 \pm 3.89 years. These results disagreed with those of **Kafl & El Sayed (2020)**, who discovered that the mean age of the study subjects was 10.66 \pm 3.21 years, and that around two thirds of them were between the ages of 6 and less than 12 years.

In relation to residence, the current research revealed that the majority of the studied students are living in urban areas. This finding was supported by **Al-Shormanet al.**, (2023) whose study reported that the largest proportion of the studied participants are living in urban areas. In contrast, **Nabeel et al.**, (2020), whose study found that more than two thirds of the studied children were in rural residents.

Additionally, this work reflected that nearly two-fifths of the studied students were at the third level of the preparatory school. Moreover, more than one third of them had 3 to 4 siblings and they were the oldest of their brothers. These results were supported by **Hussein et al. (2018)**, who demonstrated that the highest proportion of the diabetic students were in the third year of preparatory school, also they had from one to three siblings with a mean of 2.42 ± 1.32 siblings. Likewise, a study conducted by **Awad et al. (2019)** found that the studied students had siblings with mean number 3.0 ± 0.9 and most of them were ranked the first.

According to the personal data about parents age, our study indicated that less than half of the their fathers aged between 40 to 50 years old, while more than three fifths of their mothers were less than 40 years old. These results matched with those of **Nabeel et al.**, (2020) who stated that most of the children' mothers aged from 30 to 40 years old. On the other hand, a study performed by Elhawy et al., (2021) who found that the largest proportion of the fathers ranged from age between 35 to 45 years old.

Regarding father and mother education, the current study displayed that more than half of the studied fathers had secondary education, while nearly half of the studied mothers had secondary education or diploma. These results were confirmed by **Babiker et al.**, (2021) who stated that the highest percentage of the studied children' parents had secondary education. Consistently, a study conducted by **Akter et al.**, (2022) reported that the largest proportion of the studied children fathers and mothers had secondary education.

In addition, the present research cleared that more than half of the fathers were government employee, while three quarters of the studied mothers were housewives. This finding was in harmony with **Soliman et al.**, (2022) who noticed that more than half of fathers were employed. In the opposite line, a research was conducted by **Fabrizi et al.**, (2022) who found that more than three quarters of the studied caregivers were employed.

Moreover, this study demonstrated that more than one thirds of parents had relation between them and over half of them reported their parents had diabetes. These results were supported by **Neda et al.**, (2020) who stated that most of the parents were not relatives. Similarly, **Asghari et al.**, (2023) who carried out a study mentioned that most of the studied participants had no family history of diabetes.

Moreover, the current study showed that most the studied students had good total knowledge about nutrition. Also, more than half of them had a good total knowledge about exercise, foot care and follow-up, respectively. In the same line, a study performed by **Aliya & Namitha**, (2018) found that more than half of high school students had a good amount of general knowledge about diabetes, nonmedical measures and lifestyle choices respectively.

Pertaining the studied students' sources of knowledge about diabetes, the present study showed that half of them had knowledge from health care provider, while thirty percent of them had knowledge from family members. Fifteen percent of them had knowledge from social media, and about five percent had knowledge from mass media. From the research investigator point of view, this may be related to the effectiveness of educational programs or resources available to the diabetic students within family members and attending educational seminars.

Concerning the total reported practice among the studied students, the current study also highlighted that nearly one fifth of the studied students had done self- care practice, while more than two fifths of them had not done self- care practice. This result was in agreement with a study done by Kafl & El Saved, (2020) reported that more than three quarters of the studied had children unsatisfactory reported self- care practices. Awad et al. (2019) whose study found that most of the studied diabetic children had unsatisfactory self- care skills pre- intervention. In the opposite line, a study carried out by Alnasrawi & Aljebory, (2023) stated that nearly two thirds of students have moderate level of Self-care practice, while about one third of them have low level of Self-care practice.

According to relation between personal data of the studied students and their total level of knowledge, the current study in represented that a higher level of knowledge was found among older students more than 15years old, and there was a statistically significant difference between total level of knowledge and students' age. This result was compatible with that recorded by **Alhilali et al.**, (2023) who found that there was statistically significant relation between the studied students' level of knowledge about diabetes and their age.

In addition, the current study showed that there was no statistically significant association between the total knowledge of students and their gender, residence, order between brothers and number of siblings. On contrary, a study conducted by **Aliya & Namitha**, (2018) found that there was no statistically significant relation between level of knowledge and the studied students' school grad.

As regard relation between personal data of the studied students and their total reported practice, the present study revealed that there was highly statistical significant association between the studied students' total practice and their age and school grade. This can be interpreted as level of total self- care practice was higher among students who aged less than 13 years old and those at first school grad. Correspondingly, a study carried out by **Ogugua et al., (2021)** stated that young age in diabetes was identified as determinant of optimal glycemic control practices at the bivariate level of analysis.

These findings were supported by Gazzaz, (2020) who found that there was statistically significant relation between the studied students' level of practice related to diabetes and number of siblings, while there was no statistically significant relation with their gender.

Concerning the correlation between knowledge and practice scores, the present study in pointed out that there was a highly significant statistical positive correlation between the studied students' total knowledge and their total practice. This result can be explained by the fact that diabetic students who had good knowledge about diabetes mellitus. The practice of them will be improved.

This result was in accordance with Ahmed, & Mostafa (2023) whose study confirmed that there was highly statistical significant positive correlation between studied diabetic children total knowledge level and total reported practices level. Consistently, a study carried out by Alarfaj et al. (2023) declared that patients with high knowledge scores had better practice and mentioned that knowledge was revealed to significantly influence self-insulin administration, meal-skipping after taking insulin, use of home glucose monitoring, keeping snacks nearby, and taking insulin in relation to-meals.

Conclusion

Based on the results of the current study, it could be concluded that more than half of them had good knowledge about diabetes, while less than one third of them had fair knowledge and less than one fifth of them had poor knowledge. The current study also highlighted that nearly one fifth of the studied students had done practice of diabetic self care, while more than two fifths of them had not done self-care practice. Study confirmed that there was highly statistical considerable difference positive correlation between the overall knowledge and the overall practices.

Recommendations:

- 1- Health education programs and training courses should be developed and implemented for students to increase their awareness, attitude and practice about diabetes mellitus.
- 2-Programs for in-service education on diabetes management and emergency protocols for hypo- or hyperglycemia should be made available to school health nurses.
- 3- Arabic language booklet shows signs, symptoms and management of diabetes should be available in library school.

References

- Abd El Salam, E. A. H., Mohammed, N. A., Saleh, S. R. E., & Fatah, A. H. A. (2023). An Overview about Pediatric Type 1 Diabetes Mellitus. Journal of Pharmaceutical Negative Results, 313-319.
- Ahmed, I., & Mostafa, E. (2023). Assessment of the Knowledge and Practices about Diabetic Care on Preventing Diabetic Complications Among Children Suffering from Diabetes Mellitus. Helwan International Journal for Nursing Research and Practice, 2(2), 69-80.
- Akter, F., Rashid, SM., Alam, N., Lipi, N., Qayum, MO., Nurunnahar, M., & Mannan, A. (2022). Knowledge, attitude and practice of diabetes among secondary school-going children in Bangladesh. Frontiers in Public Health, 10, 1047617.

- Alarfaj, R. M., Alayed, D., & Alarfaj, R.
 (2023). Knowledge and Practice of Use of Insulin Therapy Among Patients With Type 2 Diabetes Attending Primary Health Care Centers, Riyadh, Saudi Arabia: A Cross-Sectional Study. Cureus, 15(2).
- Alhilali, MY., Alhilaly, YS., Alkalash, S., Alhilali, M., & Alkalash, SH. (2023). Knowledge and Attitude of School Students About Diabetes Mellitus in the Western Region of Saudi Arabia. Cureus, 15(10).
- Aliya, N., & Namitha, D. (2018). Knowledge of Diabetes among Rural High School Children of Mandya.International Journal of Biochemistry and Biophysics.6.71-75.10.13189/ijbb.2018.060301.
- Al-nasrawi, M. M. A., & Aljebory, M. K. A. (2023). Relationship between Self-Care Practices of Secondary School Students with Type 1 Diabetes Mellitus and Their Socio-Demographic Data. Journal Port Science Research, 6(1), 42-46.
- Al-Shormant, N. A. D., Atiyeh, H., Kassab, M., & Al-Rjoub, S. F. (2023). Effects of an educational program on self-efficacy towards type 1 diabetes mellitus disease among parents and adolescents in Jordan. Journal of Pediatric Nursing, 71, 66-72.
- Asghari, N., Dashtebozorgi, B., Rostami, S., Ghanbari, S., & Riahi-Ghahfarokhi, K. (2023). Improving self-management and diabetes indicators in adolescents with type 1 diabetes through self-care education. Journal of Family Medicine and Primary Care, 12(10), 2322-2327.
- Awad, L. A., Elghadban, F. E. E., & El-Adham, N. A. (2019). Effect of an intervention program on improving knowledge and self-care practices for diabetic school-age children. American Journal of Nursing, 7(2), 199-207.
- Babiker, A., Al Aqeel, B., Marie, S., Omer,
 H., Bahabri, A., Al Shaikh, A., & Al
 Alwan, I. (2021). Quality of life and
 glycemic control in Saudi children with
 type 1 diabetes at different

developmental age groups. Clinical Medicine Insights: Endocrinology and Diabetes, 14, 1179551421990678.

- Bakalis, V., Maria, M., Paraskevi, T., & Sofia, Z. (2018). Improvement of diabetic patients nursing care by the development of educational programs. Health Psychol Res. 2018 Jan 13; 2(1): 931.
- Caruso, R., Rebora, P., Dellafiore, F., Fabrizi, D., Riegel, B., Ausili, D., & Di Mauro, S. (2019). Clinical and socio-demographic determinants of inadequate self-care in adults with type 1 diabetes mellitus: the leading role of self-care confidence. Acta Diabetologica, 56, 151-161.
- Datye, K., Bonnet, K., Schlundt, D., & Jaser, S. (2019). Experiences of adolescents and emerging adults living with type 1 diabetes. The Diabetes Educator, 45(2), 194–202.
- Edraki, M., Zarei, A., Soltanian, M., & Moravej, H. (2020). The effect of peer education on self-care behaviors and the mean of glycosylated hemoglobin in adolescents with type 1 diabetes: a randomized controlled clinical trial. International Journal of Community Based Nursing and Midwifery, 8(3), 209.
- El Hawy, LL., Hussein, YH., & Eldeeb, SM. (2021). Effect of Caregiver's Health Education on Patterns of Self-Management and Glycemic Control in Pediatric Type 1 Diabetes. Egyptian Journal of Community Medicine, 39(2), 83-93.
- Elsobky, F. A., Darweesh, H. A. M., Alzahrani, S. H. A., & Bassam, S. E. A. (2022). The Impact of a Self-Management Program Based on the 5 A's Model on Type 1 Diabetes in School-Aged Children. Annals of nutrition&metabolism,78(4),197–206.
- Fabrizi, D., Natta, I., Luciani, M., Di Mauro,
 S., Rebora, P., & Ausili, D.
 (2022). Self-care and caregiver

contribution to self-care in adolescents with type 1 diabetes mellitus: a pilot cross-sectional study. International Diabetes Nursing, 15(12), 1-10.

- Gazzaz, ZJ. (2020). Knowledge, attitudes, and practices regarding diabetes mellitus among university students in Jeddah, Saudi Arabia. Diabetes, Metabolic Syndrome and Obesity, 5071-5078.
- Goethals, ER., Commissariat, PV., Volkening, LK., Markowitz, JT., & Laffel, LM. (2020). Assessing readiness for independent self- care in adolescents with type 1 diabetes: introducing the RISQ. Diabetes research and clinical practice, 162, 108110.
- Hussein, N. K. A., Ramadan, S. H. S., & Abd ElWahed, A. Y. (2018). Self-Care Practices of Preparatory School Students with Type 1 Diabetes Mellitus in ELBehira Governorate. American Journal of Nursing, 6(7), 407-417.
- Ibrahim Eldesouky Mohamed, E., Tag Mohamed Mohamed, A., Gomaa Eldawoodv Ali, Н., Mohamed Mohamed Abd El Rahman, R., & Eaid Elgazzar, S. (2024). Effect of Structured Educational Program on Diabetic Patients' Attitude, Knowledge and Practices Regarding Self-Administration of Insulin Injection. Egyptian Journal of Health Care, 15(2), 18-35.
- Kafl, R. H., & El Sayed, A. I. I. (2020). Self-Care Management of Children with Type 1 Diabetes Mellitus: Effect of an Educational Training Program.Journal of Nursing and Health Science,8(6):11-7.
- Lee, AA., Piette, JD., Heisler, M., Janevic, MR., & Rosland, AM. (2019). Diabetes self-management and glycemic control: The role of autonomy support from informal health supporters. Health psychology, 38(2), 122.

Leslie RD, Evans-Molina C, Freund-Brown J, Buzzetti R, Dabelea D, Gillespie KM,

Goland R, Jones AG, Kacher M, Phillips LS, Rolandsson O, Wardian JL, Dunne JL. 2021 Adult-Onset Type 1 Diabetes: Current Understanding and Challenges. Diabetes Care. Nov;44(11):2449-2456.

- Majeed, S., Sultana, R., Shakeel, A., Ashraf, N., Perveen, F., & Rafique, S. (2022). Individualized Approaches to Diabetes Care in Nursing Homes. Pakistan Journal of Medical & Health Sciences, 16(11), 3-3.
- Mbuagbaw, L., Aronson, R., Walker, A., Brown, R. E., & Orzech, N. (2021): The LMC Skills, Confidence & Preparedness Index (SCPI): Development And Evaluation Of A Novel Tool For Assessing Self-Management In Patients With Diabetes. Health And Quality Of Life Outcomes, 15(27), 1-9.
- Mobasseri M, Shirmohammadi M, Amiri T, Vahed N, Hosseini Fard H, Ghojazadeh M. 2020 Prevalence and incidence of type 1 diabetes in the world: a systematic review and meta-analysis. Health Promot Perspect. ;10(2):98-115.
- Montali, L., Zulato, E., Cornara, M., Ausili, D., & Luciani, M. (2022). Barriers and facilitators of type 1 diabetes self-care in adolescents and young adults. Journal of Pediatric Nursing, 62, 136-143.
- Nabeel Mohammad, F., Abdelateef Abdelaziz Ramadan, R., & Mosbah Elsayed Mohamed, N. (2020). Knowledge and Self-efficacy among Children with Type 1 Diabetes and their Caregivers. Egyptian Journal of Health Care, 11(1), 1199-1210.
- Neda, S., Zahra, G., Asadollah, R., & Zaha, DA. (2020). Evaluation of self-care training in adolescents with type 1 diabetes at the iranian diabetes association. J Adv Pharm Educ, Research Jan-Mar, 10, 1.

Ogugua, CF., Chikani, UN., Okiche, CY., & Ibekwe, UM. (2021). Sociodemographic determinants of glycaemic control among children with type 1 diabetes in South Eastern Nigeria. Pan African Medical Journal, 38(1).

- Patterson, CC., Karuranga, S., Salpea, P., Saeedi, P., Dahlquist, G., & Soltesz, G. Worldwide (2019). estimates of incidence, prevalence and mortality of type 1 diabetes in children and adolescents : Results from the International Diabetes Federation Diabetes Atlas, 9th edition, 157:107842.
- Saad, A. M., Ibraheim, S. G. E., & Abdelrahman, B. M. (2022). BASNEF Model Based Educational Guidelines regarding Foot Care among Type II Diabetic Patients. Egyptian Journal of Nursing and Health Sciences, 3(2), 163-189.
- Salah Eldin Mohamed Diab, S., & Abdel Malek Hussein, A. (2023). Barriers and Facilitators that Affect Self-Care Practices among Children with Type 1 Diabetes. International Egyptian Journal of Nursing Sciences and Research, 3(2), 669-684.
- Särnblad S, Åkesson K, Fernström L, Ilvered R, Forsander G (2016). Improved diabetes management in Swedish schools: results from two national surveys. Pediatr Diabetes 18:463–469. doi: 10.1111/pedi.12418.
- Soliman, HH., Ouda, WE., Mohamed, MF., & Kafl, RH. (2022). Effect of Educational Intervention on Pediatric Diabetes self Care Practices.
- Weinstock, RS., Aleppo, G., Bailey, TS., Bergenstal, RM., Fisher, WA., Greenwood, DA., & Young, LA. (2020). The role of blood glucose monitoring in diabetes management. Compendia, 2020(3).
- Wherrett, DK., Ho, J., Huot, C., Legault, L., Nakhla, M., & Rosolowsky, E. (2018). Diabetes Canada Clinical

Practice Guidelines for the Prevention and Management of Diabetes in Canada: Type 1 Diabetes in Children and Adolescents. Can J Diabetes. 2018;42(Suppl. 1):S234-46.

- Wilson D, Hockenberry MJ (2014). Wong's clinical manual of pediatric nursing, 8th. ed. London, UK: Mosby; 1223–1229.
- Wilt, L. (2022). The role of school nurse presence in parent and student perceptions of helpfulness, safety, and satisfaction with type 1 diabetes care. The Journal of School Nursing, 38(2), 161-172.
- Yahaya, TO., & Ufuoma, SB. (2020). Genetics and Pathophysiology of Maturity-onset Diabetes of the Young (MODY): A review of current trends. Oman Medical Journal, 35(3), 1-10.