

Self-Care Practices of Preparatory School Students with Type 1 Diabetes Mellitus in ELBehira Governorate

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Abstract Background: Type 1 diabetes (T1D) is more prevailing disease in adolescence. Intervening in self-care is crucial for disease management and to reduce the risk of diabetes-specific complications. **The aim of the study** was to assess self-care practices of preparatory school students with type 1 Diabetes Mellitus in EL Behira Governorate, Egypt. **Subjects:** A total number of 300 students constituted the subjects of the study. **Research design:** A descriptive research design was used. **Setting:** Data was gained from governmental preparatory schools in El-Behira governorate. **Sampling** students were chosen by multistage sampling technique. **Tools:** one tool was used for data collection, a structured interview schedule composed of three parts to collect data about socio-demographic characteristics, students' knowledge about T1D, and assessment of students' self-care practices. **Results:** 53.3% of the studied diabetic preparatory school students have fair total self-care practices score while 29.7% of them have poor self-care practices. A significant difference was revealed between the studied diabetic students' total score of knowledge and self-care practices. 76.7% of the studied diabetic preparatory school students have poor total knowledge score. A significant difference was revealed between the studied diabetic students' total score of knowledge and self-care practices. In addition, diabetic students' age, previous hospitalization due to hypo/hyperglycemic coma, duration of disease discovery and socioeconomic status were significantly varied among them in relation to their total knowledge and self-care practices scores. Moreover, diabetic students' gender, father's education, mothers' education, mother's working condition were significantly varied among them in relation to their total self-care practices score. **Conclusion and recommendations:** The results of the present study concluded that the highest percentage of the studied diabetic preparatory school students have either fair or poor self-care practices and poor total knowledge score, so it is recommended to develop hotlines, mass media campaigns for dissemination of accurate information about juvenile diabetes and establishing an accurate surveillance and documentation system of diabetic students for easy accessibility and provision of accurate information.

Keywords: practice, diabetes, self-care, school' students

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1. Introduction

Type 1 diabetes mellitus (T1DM) is a highly prevalent chronic disease and an important public health problem especially in childhood and adolescent's stages. Additionally, T1DM is considered one of the most common metabolic and endocrine diseases among adolescents. [1] According to the International Diabetes Federation (IDF-2015), the number of children aged 0 to 14 years with T1DM was 542,000 worldwide. [2] In Egypt, there's lack of information concerning prevalence of T1DM among adolescents; since the latest incidence of T1DM in children aged 0 to 14 was 8/100,000 according to the IDF-2011, [3] while in adult there were 8.222.600 cases of diabetes with prevalence rate 15.1% (IFD 2017). [4]

Diabetes mellitus can affect physical growth and development and lead to damage, dysfunction, or failure

of numerous organs especially eyes, kidneys, nerves, etc. [5] Childhood diabetes is quick in its onset presenting with the classic triad of symptoms: polyuria, polydipsia, and polyphagia. In spite of the hunger and increase dietary intake, the child be defeated his weight. The symptoms can seem insidiously, with fatigue, anorexia, nausea, lethargy, and weakness. [6]

Individual with T1DM needs a resource of exogenous insulin to sustain his life. [7] Without insulin, the patient can develop diabetic ketoacidosis; a life threatening condition leading to metabolic acidosis. [8]

Self-care practices are crucial for controlling blood glucose level. Studies propose that as the maximum amount as 95% of the self-care is typically provided by the patient or their families' Diabetes self-care activities in children and young adults were terribly compliant with taking medication however were solely moderately compliant to diet and self-glucose observance and least compliant to exercise. [9] Besides, individuals affected

with the illness usually have inadequate information regarding the character of disease, its risk factors and associated complications. This lack of awareness is also the underlying issue touching attitudes and practices in the direction of its care. [10]

T1DM and its complications may disturb adolescents' living conditions over the years and may also affect their worth of being. Irresponsibility, difficulties in attaining autonomous control and a low degree of illness acceptance may hamper the everyday control of blood glucose levels. Overall, adolescents are more resilient to accommodating the disease than younger children since they no longer rely on their parents or caretakers for care and are accountable for their own wellbeing. [11]

Inadequate diabetic self-management remains a big drawback facing health care providers and populations in all settings. It has a bearing on the patient's morbidity, mortality plus increasing the costs of medication and laboratory tests, time consuming and effort of the care providers. [12] In disparity, patients who have sufficient self-management have healthier outcomes, live longer, appreciate a higher quality of life and feel pain of fewer symptoms & negligible complications. [13]

School health nurse is in 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. [14]

From analysis of the appropriate literature, it's evident that nationally there are several studies were conducted on diabetic children for a number of purposes including, studies in self-care practice of diabetic patients, [15] as well as here are generally restricted studies in El-Behaira Governorate. Accordingly, the aim of this study was to assess self-care practices of preparatory school students with Type 1 Diabetes Mellitus in EL Behira Governorate.

The research question of this study was:

What are the self-care practices of preparatory school students with type 1 Diabetes Mellitus in EL Behira governorate?

2. Material and Methods

2.1. Research Design

A descriptive research design was accompanied to achieve the aim of the study.

2.2. Setting of Study

Data were gained from governmental preparatory schools in El-Behira governorate.

2.3. Subjects of Study

The target population of this study was all students with type 1 diabetes mellitus registered in preparatory schools.

2.4. Sample Size

Sample size was 300 based on the prevalence of DM [16] 25% with a precision of 6%, alpha error = 0.05 and design effect = 2, so sample size equal 300 students.

2.5. Sampling Technique

The schools' health insurance system in El-Behira governorate composed of three zones. Hence, subjects were chosen by multistage sampling technique through selecting a representative center from each zone based on the highest number of diabetic students found according to data collected from ElBehira health insurance system in the scholastic year 2015/2016, namely: - El Mhmodia (91 diabetic students), Damanhour (133 diabetic students) and El Rahmania (76 diabetic students), then all governmental preparatory schools belonged to above mentioned centers were enclosed in the study.

2.6. Tool for Data Collection

One tool was used to collect the data. A structured interview schedule was developed by the researchers after a thorough review of relevant literature and consists of three parts:-

2.6.1. Part (1): Socio-demographic Data

- Personal data:- age, sex, scholastic year, affiliated educational center, residence, birth order, siblings, attendance of training classes about diabetes mellitus and its management, type of housing and crowding index.
- Family data: - general characteristics of parents as age, occupation and level of education.
- Family Socioeconomic Status Scale (SES):- This scale was generated in 1983 by Fahmy and El-Sherbini. It was updated and validated by El-Gilany, El-Wehady and El-Wasify in 2012 in English language. [17] It was translated into Arabic language by the researchers. It contains seven domains as follows; education and culture for parents (30), occupation (10), family (10), family possessions (12), home sanitation (12), economic (5), health care (5). This creates a total SES score of 84 which was classified into four levels based on the quartiles:

Very low	< 25%
Low	25% - < 50%
Middle	50% - < 75%
High	≥ 75%

In case of death or retirement of husband or wife, the education and occupation before death or retirement were recorded.

2.6.2. Part (2): Knowledge of Students Regarding Management of DM

- Basic knowledge about diabetes: Definition, normal levels of fasting blood sugar, risk factors for diabetes and diabetes symptoms.

- Knowledge about diabetes complications: Causes, symptoms and management of hyperglycaemia and hypoglycaemia.
- Knowledge about diabetes management: insulin, dietary pattern, physical exercise, foot care and Importance of follow up visits.

Scoring system for assessing knowledge of students entails 43 items and the correct answers were pre-determined according to the literature review. A score of (2) was given to the correct complete answer, a score of (1) for correct but incomplete answer and a score of (0) for the wrong or missed answers. So, the total knowledge score ranged from 0 - 86 and was categorized into: The total percentage of the total knowledge score was calculated as follows:-

- Poor knowledge < 43, (< 50%)
- Fair knowledge 43- <65, (50 - <75%)
- Good knowledge ≥ 65 , ($\geq 75\%$).

2.6.3. Part (3) Self-care Practices of Diabetes Mellitus:-

- Insulin regimen: adherence for insulin use in controlling diabetes as regards to its type, dose, frequency and time of administration in relation to meals, patient's practice of self-insulin injection technique.
- management of complications: patient's practice about symptoms and measures of intervention in case of hyperglycemia or hypoglycemia, presence of diabetic patient identification card, previous hospitalization.
- Follow up activities: regularity of diabetic clinic visit, laboratory investigation & its regularity.
- Dietary practices: practice about adherence to dietary regimen, meal planning method that the patient follows, number of meals per day, intake of snacks and regularity of meals times.
- Physical exercise: patient's adherence to physical exercise program and its regularity, precautions for practicing exercise as regards to its time of performance in relation to meals, blood glucose monitoring, insulin injection, changing sites of injection according to type of exercise performed and existence of diabetic coma afterward physical exercise.
- Personal hygiene and foot care: patient's hygienic practices as number of bathing per week, teeth care. foot care practices include, number of feet wash / day, daily feet observation, technique of feet dryness, wearing socks, type of socks, type of chose, wearing shoes at home.

Scoring system for assessing students' practice regarding diabetes includes 52 items. The items were scored as follows: A score "1" was given to performed practice, while, score "0" was given to incorrect or never done. The total practice score was obtained for each participant (0-52). The percentage of total practice score was calculated as follows:

- Poor practice <26 (less than 50%)
- Fair practice 26-<39 (50-<75%)
- Good practice ≥ 39 ($\geq 75\%$)

2.7. Methods

- Basically, official letters from the faculty of nursing, university of Damanhour were directed to the responsible health authorities of study settings (Central Agency for Public Mobilization and Statistics CAPMAS, Directorate of Education and school health insurance in El-Behira governorate) to take their permission to conduct the study after explaining its purpose.
- Permission was obtained from Directorate of Education in El-Behira governorate to collect data from schools affiliated to the selected centers.
- Tool was developed by the researchers after a thorough review of relevant literature including data from students' health record.
- Tool was tested for reliability by test and retest and for validity by exposing them to a Jury composed of 3 experts in the field.
- The purpose and the nature of the study were clarified to students, for full cooperation. The researchers were able to interview about 8 – 10 students daily. Each sheet took 15-20 minutes to be answered. Data was collected during the academic years 2016 – 2017.
- A pilot study was conducted on a sample of randomly selected 15 students not included in the study to ascertain the clarity and applicability of the tool and to estimate the time needed to fill the study tools. Based on the result, the necessary modifications were made.
- The school administrator was met by the researchers to gain his cooperation after explaining the purpose of the study.
- Ethical consideration, Oral informed consent was obtained from every student included in the study after explanation of the purpose of the study.
- Each student was interviewed individually after establishing trustful relationship with him to gain his cooperation and confidence this was attained through explaining the purpose of the study, promising that the collected data will be used only for the purpose of the study and inform them about their unpaid sharing in the study.

2.8. Statistical Analysis of the Data

After collection of data, it was coded and transferred into special format, so as to be suitable for computer feeding. The Statistical Package for Social Sciences (SPSS) version 20 was utilized for data analysis and tabulation. Frequencies and percentage were calculated. The level of significance selected for this study was equal to 0.05. The tests of significance used in this study were; chi-square test (X^2).

3. Results

Table 1 shows that 41.7% of the studied diabetic students aged between 12 to less than 13 years with a

mean age 12.34 ± 1.23 and females represent 55.0% of them. The highest percent (47.5 %) of the studied diabetic students are enrolled in the third year of preparatory school and 40.3 of them were affiliated to Damanhour educational center. In addition, 56.0% of them were lived in rural areas and 68.3 % of them are ranged as the first to the third child in their families with a mean of $2.65 + 1.212$ also 59.0% of them have one to three siblings with a mean of $2.42+ 1.32$. Finally, the majority (84.3%) of the studied diabetic students is lived in owned housing and 90.3 of them haven't attended training classes about DM and its management.

Table 1. Distribution of the studied diabetic students according to their socio-demographic characteristics and training experience about DM

Socio-demographic characteristics	No. n=300	%
Age (in years)		
12 -	125	41.7
13 -	95	31.6
≥ 14	80	26.7
Mean ± SD	12.34 ± 1.23	
Sex		
Female	165	55.0
Male	135	45.0
Scholastic year		
First	113	26.6
Second	70	25.9
Third	117	47.5
Affiliated educational center		
Damanhour	121	40.3
El Mahmodia	96	32.0
El Rahmania	83	27.7
Residence		
Rural	168	56.0
Urban	132	44.0
Birth order		
1 -3	205	68.3
4 -6	95	31.7
Mean ± SD	2.65 ± 1.212	
Siblings		
1 – 3	177	59.0
4 – 6	87	29.0
No siblings	36	12.0
Mean ± SD	2.42 ± 1.32	
Type of housing		
Owned	253	84.3
Rented	47	15.7
Attendance of training classes about DM and its management		
Yes	28	9.3
No	272	90.7

Table 2. portrays that 73.7 of the studied diabetic students' fathers aged between 30 to less than 50 years with a mean of 40.67 ± 13.25 and equal percent of them

(26.3%) have either primary/read and write or secondary school education. In addition, 91.6 % of them are working. Regarding the studied diabetic students' mothers, 63.4% of them aged between 40 to less than 60 years with a mean of 37.42 ± 7.54 . Illiteracy was observed among 40.3% of them while 79.0 % of them were housewives. The family crowding index is ranged between 1-3 among 95.3% of the studied diabetic students' families. Finally, the majority (55.6%, 33.7%) of the studied diabetic students' families have either low or moderate socioeconomic status.

Table 2. Distribution of the studied diabetic student's parents according to their socio-demographic characteristics

Socio-demographic characteristics	No.	%
1- Diabetic students' father*	(n=285)	
• Age (in years)		
• 30-	210	73.7
• 50-	55	19.3
• 70	20	7.0
Mean + SD	$40.67 + 13.25$	
Education		
• Illiterate	60	21.0
• Primary/ Read & write	75	26.3
• Preparatory	18	6.3
• Secondary	75	26.3
• University	57	20.0
Occupation		
• Working	261	91.6
• Not working	24	8.4
2-Diabetic students' mother#	(n=295)	
• Age (in years)		
• 20-	100	33.9
• 40-	187	63.4
• 60	8	2.7
Mean + SD	$37.42 + 7.54$	
Education		
• Illiterate	120	40.7
• Primary/ Read & write	36	12.2
• Preparatory	15	5.1
• Secondary	96	32.5
• University	28	9.5
Occupation		
• Housewife	233	79.0
• working	62	21.0
Crowding index		
• 1-3	286	95.3
• 4-6	14	4.7
Mean + SD	$1.02+ 2.11$	
Socioeconomic status (SES)		
• Very low	18	6.0
• Low	167	55.6
• Moderate	101	33.7
• High	14	4.7

* Dead fathers = 15 (5.0%) # Dead mothers = 5 (1.6 %)

Table 3. portrays that 33.0 % of the studied diabetic students discovered the disease from four to less than six years with a mean of 3.52 ± 0.983 . The main method of disease discovery is appearance classical manifestations of DM which was found among 81.7% of the studied diabetic students.

Table 3

Diabetic history	Total n=300	
	No	%
Disease discovery (in years)		
< 2	55	18.3
2-	90	30.0
4 -	99	33.0
≥ 6	56	18.7
Mean + SD	3.52 + 0.983	
Method of disease discovery		
Classical manifestations	245	81.7
Coma	40	13.3
Check up	15	5.0

Figure 1. Displays that 76.7% of the studied diabetic students had poor total knowledge score and 22.3% of them had fair total knowledge score about different aspects of DM and its management.

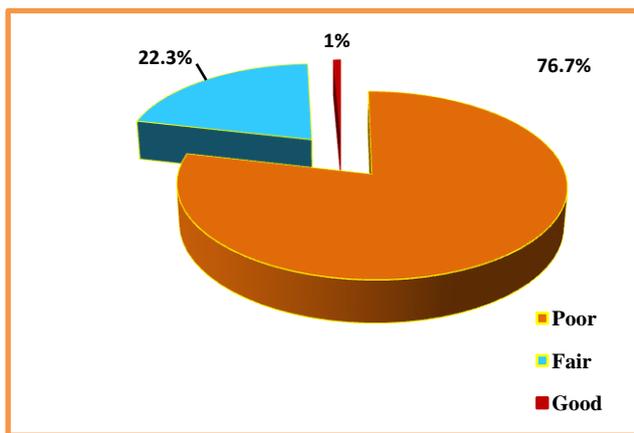


Figure 1. Distribution of the studied sample according to their total knowledge score about DM and its management.

Figure 2. Represents that 53.3% of the studied diabetic students have fair total self-care practices score whereas 29.7% and 17.0% of them have either poor or good total self-care practices respectively.

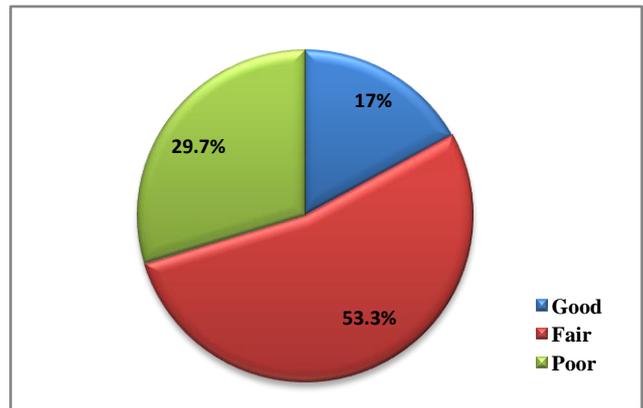


Figure 2. Distribution of the studied diabetic students according to their total self-care practice score

Table 4. Represents that most of the studied diabetic students have fair (61.7%) or poor (26.7%) insulin regimen practices. Self-monitoring of blood glucose level is mainly either fair (55.3%) or poor (38.0%) among the studied diabetic students. Fair practices during hyper or hypoglycemia and dietary regimen are observed among 55.0 and 79.7% of the studied diabetic students. In addition, most of them have fair (58.7%) or poor (37.3%) physical exercise practices. Most of the studied diabetic students have either fair (57.0 %) or good (26.0%) follow up activities in addition; fair and poor personal hygiene and foot care practices are observed among 60.0% and 22.7% of them, respectively.

Table 5. Presents a statistically significant difference between the studied diabetic students' total knowledge score and their age (P= 0.008), previous hospitalization due to hypo/hyperglycemic coma (P=0.002) and duration of disease discovery (P= 0.050) and socioeconomic status (P =0.037). On the other hand, no statistically significant difference is found between the studied diabetic students' total knowledge score and their gender (P=0.254), residence (P= 0.846), birth order (P= 0.411) and method of disease discovery (P = 0.844).

Table 6. Reveals a statistically significant difference between the studied diabetic students' total self-care practice score and their gender (P= 0.006), age (P= 0.004), previous hospitalization due to hypo/hyperglycemic coma (P =0.032) and duration of disease discovery (P= 0.047). On the other hand, no statistically significant difference is found between the studied diabetic students' total self-care practice score and their residence (P = 0.132), birth order (P = 0.236) and method of disease discovery (P = 0.467).

Table 4. Self-care practices' scores of the studied diabetic students

Practices	Good		Fair		Poor	
	No	%	No	%	No	%
Insulin regimen	35	11.7	185	61.7	80	26.7
Self-monitoring of blood glucose level (SMBG)	20	6.7	166	55.3	114	38.0
Managing practices during hyper/ hypoglycemia	46	15.3	165	55.0	89	29.7
Dietary regimen	15	5.0	239	79.7	46	15.3
Physical exercise	12	4.0	176	58.7	112	37.3
Follow up	78	26.0	171	57.0	51	17.0
Personal hygiene and foot care	52	17.3	180	60.0	68	22.7

Table 5. Relationship between the studied diabetic students' total knowledge score and certain students' characteristics

Students' characteristics		Knowledge score		Good		Fair		Poor		Total		X ² (P value)
		No	%	No	%	No.	%	No	%			
Gender	Male	0	0.0	25	18.5	110	81.5	135	45.0	(0.254)		
	Female	2	1.2	36	21.8	127	77.0	165	55.0			
Age	12-	0	0.0	24	18.2	108	81.8	132	44.0	(0.008*)		
	13-	2	2.3	19	22.1	65	75.6	86	28.7			
	≥14	0	0.0	19	23.2	63	76.8	82	27.3			
Residence	Rural	2	0.6	38	21.4	128	78.0	168	56.0	(0.846)		
	Urban	1	0.7	24	18.2	107	81.1	132	44.0			
Birth order	1-3	1	0.5	40	19.5	164	80.0	205	68.3	(0.411)		
	4-6	2	2.1	24	25.3	69	72.6	95	31.7			
Hospitalization due to hypo/hyperglycemic coma	1-	1	0.9	26	22.0	91	77.1	118	39.4	(0.002*)		
	4-	1	6.2	2	12.5	13	81.3	16	5.3			
	≥ 7	0	0.0	5	71.4	2	28.6	7	2.3			
	No	0	0.0	29	18.2	130	81.8	159	53.0			
Duration of disease discovery	< 2	6	10.9	15	27.3	34	61.8	55	18.3	(0.050*)		
	2-	10	11.1	20	22.2	60	66.7	90	30.0			
	4-	70	70.7	28	28.3	1	1.0	99	33.0			
	≥ 6	40	71.4	15	26.8	1	1.8	56	18.7			
Method of disease discovery	Clinical manifestations	2	0.8	54	22.1	189	77.1	245	81.7	(0.844)		
	Occurrence of coma	2	5.0	8	20.0	30	75.0	40	13.3			
	Check up	8	53.4	5	33.3	2	13.3	15	5.0			
Socio-economic status	Very low	4	22.2	6	33.3	8	44.5	18	6.0	(0.037*)		
	Low	30	18.0	79	47.3	58	34.7	167	55.6			
	Moderate	28	27.7	51	50.5	22	21.8	101	33.7			
	High	7	50.0	5	35.7	2	14.3	14	4.7			

Table 6. Relationship between the studied diabetic students' total self-care practice and certain students' characteristics

Students' characteristics		Total self-care practice score		Good		Fair		Poor		Total		X ² (P value)
		No	%	No	%	No.	%	No.	%			
Gender	Male	44	32.6	68	50.4	23	17.0	135	45.0	(0.006*)		
	Female	32	19.3	97	58.9	36	21.8	165	55.0			
Age	12-	24	18.2	64	48.5	44	33.3	132	44.0	(0.004*)		
	13-	0	0	19	22.1	67	77.9	86	28.7			
	≥14	2	2.4	20	62.5	60	73.2	82	27.3			
Residence	Rural	44	26.2	80	47.6	44	26.2	168	56.0	(0.132)		
	Urban	30	22.7	82	62.1	20	15.2	132	44.0			
Birth order	1-3	9	4.4	36	17.6	160	78.0	205	68.3	(0.236)		
	4-6	7	7.4	20	21.0	68	71.6	95	31.7			
Hospitalization due to hypo/hyperglycemic coma	1-	25	0.9	69	22.0	24	77.1	118	39.4	(0.032*)		
	4-	2	6.2	8	12.5	6	81.3	16	5.3			
	≥ 7	0	0.0	6	71.4	1	28.6	7	2.3			
	No	37	0.0	81	18.2	41	81.8	159	53.0			
Duration of disease discovery	< 2	2	3.6	40	72.8	13	23.6	55	18.3	(0.047*)		
	2-	10	11.1	58	64.4	22	24.5	90	30.0			
	4-	10	10.1	66	66.7	23	23.2	99	33.0			
	≥ 6	7	12.5	39	69.6	10	17.9	56	18.7			
Method of disease discovery	Clinical manifestations	53	21.6	132	53.9	60	24.5	245	81.7	(0.467)		
	Occurrence of coma	4	10.0	26	65.0	10	25.0	40	13.3			
	Check up	3	20.0	10	66.7	2	13.3	15	5.0			

Table 7. Relationship between the studied diabetic students' total self-care practices score and their family characteristics

Family characteristics		Total self-care practice score		Good		Fair		Poor		Total		X ² (P value)
		No.	%	No.	%	No.	%	No.	%	No.	%	
Father's education	Illiterate	8	13.3	30	50.0	22	36.7	60	21.0	(0.022*)		
	Primary/read and write	14	18.7	45	60.0	16	8.0	75	26.3			
	Preparatory	6	33.3	11	61.1	1	5.6	18	6.3			
	Secondary	11	14.7	34	45.3	30	40.0	75	26.3			
	University	11	19.3	31	54.4	15	26.3	57	20.0			
Mother's education	Illiterate	35	29.2	65	54.2	20	16.7	120	40.7	(0.006*)		
	Primary/read and write	4	11.1	25	69.5	7	19.4	36	12.2			
	Preparatory	2	13.3	9	60.0	4	26.7	15	5.1			
	Secondary	14	14.6	51	53.1	31	32.3	96	32.5			
	University	6	21.4	13	46.5	9	32.1	28	9.5			
Mother's working condition	Working	12	19.3	37	59.7	13	21.0	62	21.0	(0.034*)		
	House wife	18	7.7	160	68.7	55	23.6	233	79.0			
Crowding index	1-3	32	11.2	192	67.1	62	21.7	286	95.3	0.746		
	4-6	3	21.4	6	42.9	5	35.7	14	4.7			
Socio-economic status	Very low	3	16.7	6	33.3	9	50.0	18	6.0	(0.003*)		
	Low	27	16.2	80	47.9	60	35.9	167	55.6			
	Moderate	30	29.7	50	49.5	21	20.8	101	33.7			
	High	6	42.9	5	35.7	3	21.4	14	4.7			

Table 8. Relationship between the studied diabetic students' total self-care practices and total knowledge scores

Knowledge	Self-care	Good		Fair		Poor		Total N=300		X ² (P value)
		No.	%	No.	%	No.	%	No.	%	
Good		0	0.0	2	100.0	0	0.0	2	0.7	(0.045*)
Fair		9	14.5	37	59.7	16	25.8	62	20.7	
Poor		55	23.3	125	53.0	56	23.7	236	78.6	

X²: chi-square test, *Significant at 0.05 level.

Table 7. Portrays a statistically significant difference between the studied diabetic students' total self-care practice score and their father's education (P= 0.022), mothers' education (P= 0.006) and mother's working condition (P =0.034) and socioeconomic status (P =0.003) however no statistically significant difference was found in relation to their crowding index(P =0.746).

Table 8. Illustrates a statistically significant difference between the studied diabetic students' total self-care practice and total knowledge score a (X² =0.045).

4. Discussion

Self-management is crucial for better physical and psychological consequences of the diabetes especially among the growing children. They should be supported to promote their autonomy and self-care capacity. Hence, need-based self-care education is essential for better glycemic control and prevention or even reduces both the onset and progression of diabetes complications. [18,19]

The present study depicted that most of the studied diabetic students had fair (53.3%) and poor (28.7%) total self-care practice whereas 17.0 % of them had good self-care practices. This can be ought to the young age of the

studied sample where 41.7% of them aged between 12<13 years where this early adolescence period is an open stage for outside world and negative peer influence on their health behaviors. Furthermore, there is prevalent poor knowledge level (76.7%) among the studied diabetic students about DM and its management. This was coupled with the low socioeconomic status apparent among 55.6% of them.

Concurred findings were shown by four recent studies. *First*, Lin K et al (2016) [20] found that most of the studied Chinese diabetic children had poor self-care behaviors. *Second*, Madian A and Ismail S (2015) [21] found that all the studied Egyptian diabetic students had either fair or poor total self-care practice score. *Third*, Hackworth N et al (2013) [22] revealed suboptimal diabetes self-care regimes among their studied Australian diabetic adolescents. *Fourth*, Vasli et al (2009) [23] asserted that three quarters of the studied Iranian diabetic children had average to weak self-care practices score.

Contradictory results were shown by Salehi S et al (2014) [24] explored that their studied Iranian diabetic children had both good and very good self-care practices scores. This could be justified by the wider age range of the studied diabetic students (11-17 years) in this contradictory study than the current one (12-15 years)

which give chance for gaining knowledge and experience in managing the disease.

Insulin therapy is the mainstay of T1DM management. The current study portrayed that most of the studied diabetic students had either fair (61.7%) or poor (26.7%) insulin regimen practices. This explained via the irregular insulin use by many of the studied diabetic students due to forgetfulness or irregularity of meal timing. In addition, more than two fifths of them didn't practice self-insulin injection due to fear of injection or didn't know how to practice self-insulin injection. Moreover, they didn't change the insulin injection sites as they accustomed to certain body parts. This highlighted the urgent need to teach the diabetic children the correct self-insulin injection technique. Similarly, Salehi S et al (2014) [23] revealed that nearly one quarter of the studied Iranian diabetic children had average to weak insulin regimen practices despite that most of them had good insulin injection technique. They clarified that the studied diabetic children neither considered circular insulin injection to different parts of body nor adjust insulin dose in relation to physical activity and diet.

Contrast findings were revealed by two studies. *First*, Attia A and Hassan E (2017) [24] reported that none of their studied Egyptian diabetic children had adequate insulin injection practices. This could be justified by the young age of their studied sample (6-14 years). *Second*, Greene M et al (2010) [25] asserted that their studied American diabetic adolescents had high insulin regimen practices where they adjusted insulin in relation to meal. This can be ascribed to the used approach in this contradictory study of self-rating of their self-care behaviors which can be less objective.

Self-Monitoring of Blood Glucose (SMBG) is a critical aspect of T1DM management and increasing its frequency is greatly linked to improved clinical outcomes. [27] The current study portrayed that most of the studied diabetic students had either fair (55.3%) or poor (38.0%) practice of SMBG where 40.0 % of them fear from needle stick injury and neither do not have the Gluco-Check apparatus nor know how to use it. Concurred findings were portrayed by two recent evidences. *First*, Tanjia et al (2016) [28] revealed that nearly two thirds of their Asian diabetic participants never performed SMBG owing to the appeared lack of knowledge and feeling of unnecessary of doing it. *Second*, Santiprabhob J et al (2012) [29] they also portrayed poor practices of SMBG among most of their Asian diabetic adolescent.

Recent evidence showed that children with early onset of diabetes are at highest risk for disturbance of their cognitive function and neuropsychological skills, but the corresponding role of either hypo or hyperglycemia are still under investigation. Thus, the management practices for hypo/hyperglycemia must be scrutinized where both the diabetic children and their caregivers must be aware of their symptomatic management practices. [30] The present study explored that most of the studied diabetic students had either fair (55.0%) or poor (29.7%) practice during hyper or hypoglycemia. This was evidenced by that 40.0% of them had previous hospitalization due to hypo/hyperglycemic coma. Most of them kept neither a sugar source nor identification card. In addition, they increase/decrease insulin dose by themselves in

response to high/low blood glucose level whereas less than one fifth of them take no action to manage their hypo/hyperglycemic attack.

Consistent findings were revealed by Santiprabhob J et al (2012), [29] as they portrayed fair managing practices for hypo/hyperglycemic attacks among more than half of their Asian diabetic children who treated themselves with sweetened drink and carried sugar source when they traveled.

In contrast, Salehi S et al (2014) [24] showed that nearly two fifths of their studied Iranian diabetic children had good management activities for hypo/ hyperglycemia despite that half of them had no identification card which is congruent with the current study. This can be explained through the lack of knowledge of their participants about the importance of such card. The discrepancy between the current and this contrasting study could be ascribed to the smaller sample size (99) and the wider age rang (10-18 years) than the current study.

Dietary regimen is the backbone for proper metabolic control of T1DM along with insulin therapy and physical exercise. [31] The current study represented that 79.7 % and 15.3% of the studied diabetic students had either fair or poor dietary practices, respectively. Evidently, they were found to have certain misconceptions about diabetic diet as reducing complex carbohydrates (35.1%) and unimportance of diabetic meal plan (34.6%). In addition, 21.7% of them did not adherent to diabetic diet regimen and took no snacks (30.3%). Similar findings were revealed by a novel study of Silva A et al (2016), [32] as they reported that dietary compliance was the main encountered problem among their studied Brazilian diabetic adolescents.

Physical exercise is enormously imperative for diabetes management owing to its crucial role in reducing blood glucose level. [33] The present study illustrated that most of the studied diabetic students had either fair (58.7%) or poor (37.3%) physical exercise practices where more than half of them didn't participate in any sport. In addition, similar percent (69.2%) of them didn't eat or check blood glucose level in relation to any physical activity and 92.3% of them didn't change insulin injection site based on type of physical activity.

Similar findings were reported by two recent studies. *First*, Attia A and Hassan E (2017) [25] reported that more than one fifth of the studied Egyptian diabetic children had low physical exercise practices where they neither participated in any exercise program nor controlled their blood glucose before any physical activity. *Second*, Santiprabhob J et al (2012) [29] showed that most of their respondents had poor physical exercise practices as they rarely walked or did household tasks for at least 30 minutes, checked their blood glucose prior to exercising and ate extra snacks when exercising vigorously. In contrast, Silva A et al (2016) [32] showed that their studied Brazilian diabetic students had adequate physical exercise practices were more than three quarters of them participate in one or more sports. This could be ascribed to emphasizing of the author of this contradictory study on exercise performance and not taking into consideration blood glucose level monitoring and controlling practices in relation to exercise performance.

Follow up activities can be considered as a monitoring

scale for diabetes management practices. [21] The current study represented that 57.0% and 26.0% of the studied diabetic students had either fair or good follow up activities, respectively; where most of them reported regular visiting of the diabetic clinic and performing of laboratory investigation especially fasting and post prandial blood glucose level. This could be explained by their monthly need for insulin therapy which is basically determined based on their blood glucose level through the students' health insurance clinic.

Corresponding evidence was illustrated by two recent studies. *First*, Tanjia et al (2016) [28] claimed that most of their studied Asian diabetic children reported that they always attend DM clinic or visit their doctor for follow up and performed urine examination. *Second* Madian A and Ismail S (2015) [21] illustrated that most of their Egyptian diabetic children had regular follow up activities.

Proper personal hygiene especially foot care is essential aspect for diabetes management as high glycemic level could increase the risk of infection. [34] The current study confirmed that most of the studied diabetic students had either fair (60.0%) or poor (22.7%) general personal hygiene and foot care practices, respectively where more than two fifths of them didn't observe their feet regularly with improper dryness technique and had inadequate number of bathing and teeth brushing.

Conformable results were asserted by a study done by, Desalu O et al (2011), [35] as they reported that majority of their studied Nigerian diabetic patients had either satisfactory or poor foot care practice and only 10.2% of them had good practice of foot care in relation to regularity of feet inspection, washing and dryness and inspection of inside of their footwear.

Several demographic and socio-economic factors can contribute positively to facilitate self-care performance in diabetic children. Hence, it can be mediated through certain individual or familial factors. [36] Regarding individual factors, the present study portrayed a significant difference between the studied diabetic students' total self-care practice score and their gender, age, previous hospitalization due to hypo or hyperglycemic coma and duration of disease discovery. Identical findings were portrayed by two novel studies. *First*, Gomes M et al (2018) [37] revealed that self-management of T1DM among young people was associated with higher age, more years of school attendance, lower reported rates of hypoglycemia and better glycemic control. *Second*, Ryan M (2014) [38] found that age was significantly correlated with diabetes self-care practices score. Lin k et al (2016) [20] revealed no significant difference between students' age and their self-care behaviors. The author justified that by the small numbers of the studied diabetic children in their cohort study.

Regarding family factors, the current study depicted a significant difference between the studied diabetic students' total self-care practice score and their father's education, mothers' education, mother's working condition and socio-economic status. Consistent findings were illustrated by Soheilipour F et al (2015), [39] as they suggested that higher mothers' awareness is positively correlated with better blood sugar control in their children which was mainly mediated by their socioeconomic status. *Furthermore*, Niba LL et al (2017) [40] asserted that

minimal maternal involvement as a primary caregiver in self-care practices of their diabetic children were significantly associated with poor outcome.

Evidence portrayed that knowledge about diabetes and its management can mediate the relationship between self-care practices and glycemic control. [33] The present study revealed a statistically significant difference between the studied diabetic students' total self-care practice and total knowledge score. Correspondingly, Basu S et al (2017) [41] portrayed that low knowledge level about DM was a predictor of poor self-care practices and associated glycemic control. Converse findings were shown by Onuoha PH (2017) [42] who revealed that the total knowledge score was unproportionate to the level of self-care among their participants where the study showed that most of them had moderate to high total knowledge score with inadequate level of self-care practices.

Knowledge can be considered as a basic component for behavior change as it plays an essential role in shaping individuals' participation in proper health maintenance practices along with health-related beliefs. [43] The present study displayed that almost all the studied diabetic students had either poor (76.7%) or fair (22.3%) total knowledge score about DM and its management aspects. This could be attributed to the young age of the studied diabetic students (12-15 years) and the lower duration of disease discovery were about one third of the studied diabetic students discovered the disease from 4< 6 years with a mean of 3.52 ± 0.983 . Specifically, those years were mainly during primary education were children were mainly dependent on their mothers in all aspects of their life including diabetes management.

Similarly, Basu S et al (2017) [41] and Tanjia et al (2016) [28] portrayed low knowledge level among their participants in relation to diabetes and almost all aspects of its management. Conversely, Flora M and Gameiro M (2016) [44] found that most of their studied diabetic adolescents had good overall knowledge level about diabetes and its management however less than one fifth of them had low total knowledge score especially in relation to insulin regimen and management of disease's complications. Such discrepancy in the knowledge level between the current and these contradictory study could be attributed to previous attendance of the studied diabetic adolescents of DM educational programs which is incommensurable to the current study were majority of the participants didn't attend diabetes educational classes.

Moreover, the current study revealed a significant difference between the studied diabetic students' total knowledge score and their previous hospitalization due to hypo/hyperglycemic coma, duration of disease discovery and socioeconomic status. Concurred findings were shown by four recent studies. *First*, Gomes M et al (2018) [37] portrayed that DM related knowledge was associated with lower rates of severe hypoglycemia, more years of school attendance and economic status. *Second*, Moskovitz A et al (2018) [45] revealed that better knowledge score of the studied diabetic adolescents was significantly associated with longer duration of contracting the disease. *Third*, Flora M and Gameiro M (2016) [44] found positive correlation between the studied diabetic adolescents' total knowledge level and their age. *Fourth*, Desalu O et al

(2011) [35] showed that illiteracy and low socioeconomic status were significantly associated with poor knowledge level of diabetes self-care.

5. Conclusion

The results of the present study concluded that the highest percentage of the studied diabetic preparatory school students have either fair or poor self-care practices in all aspects of DM management; insulin regimen practices, SMBG, managing practices during hyper/hypoglycemia, dietary regimen, physical exercise, personal hygiene and foot care practices except follow up practices which were found to be fair or good among most of them. A significant difference was revealed between the studied diabetic students' total score of knowledge and self-care practices. In addition, diabetic students' age, previous hospitalization due to hypo/hyperglycemic coma, duration of disease discovery and socioeconomic status were significantly varied among them in relation to their total knowledge and self-care practices scores. Moreover, diabetic students' gender, father's education, mothers' education, mother's working condition were significantly varied among them in relation to their total self-care practices score.

6. Recommendations

- Developing hotlines, mass media campaigns for dissemination of accurate information about juvenile diabetes; classical manifestations, complications and self-care management
- Establish community based support groups for diabetic children and adolescents
- Establishing an accurate surveillance and documentation system of diabetic students for easy accessibility and provision of accurate information to improve their self-care capacity.
- Provide in-service training programs for school health nurses about diabetes management and emergency measures in school for either hypo or hyperglycemia.
- Motivate diabetic students' parents to participate actively in management of their diabetic children by encouraging them to attend parents' council in schools regularly.

6.1. Further Research

- Assessment of diabetic children's perceived barriers to self-care behaviors
- Impact of diabetes on scholastic achievement of the diabetic students.
- Quality of life of diabetic children's parents.

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