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Knowledge and Attitude Regarding Diabetes Type 1 among Adolescents in Nursing Secondary School

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Abstract

Background: Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disorder where the immune system attacks and destroys the insulin-producing beta cells in the pancreas **Aim of the study:** the study aims to assess Knowledge and attitudes regarding diabetes type 1 among adolescents in nursing secondary school. **Research design:** Descriptive research design will be used to achieve the aim of the current study. **Sample:** Convenient sample of nursing secondary. **Setting:** The current study was conducted at a nursing secondary school in the village of Nasser and Wasti in Beni-suef City. **Tool:** interview questionnaire sheet about adolescents' social demographics, knowledge, and attitude regarding type 1 diabetes among adolescents. **Result**: The study illustrated that a positive association between the studied students' total knowledge and attitude score p-value (<0.05*), which means increased knowledge positively increases attitudes. **Conclusion:** There is a statistically significant relationship between the social knowledge of the students studied and their attitude score. **Recommendation**: Manual handbooks containing essential nursing procedures regarding the care of adolescents with DM1

Key Words: Attitude, Adolescents, Knowledge

Introduction

Adolescence is a developmental stage that typically spans from the onset of puberty to the attainment of full adult maturity, generally encompassing the ages of 10 to 19 years. This period is characterized by significant physical, emotional, and cognitive changes as individuals transition from childhood to adulthood. the complexities navigating of identity formation and social relationships (World Health Organization, 2023).

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disorder where the immune system attacks and destroys the insulin-producing beta cells in the pancreas. This leads to an absolute deficiency of insulin, a hormone crucial for regulating blood glucose levels. As a result, individuals with T1DM must rely on lifelong insulin therapy to maintain normal blood sugar levels. T1DM typically manifests in childhood or adolescence, though it can develop at any age (**Craig et al., 2023**).

The exact cause of T1DM remains elusive, but it is widely believed to arise from a combination of genetic susceptibility and environmental factors. Certain genetic markers, particularly in the HLA region, are strongly associated with an increased risk of T1DM. Environmental triggers, such as viral infections and early dietary exposures, are also thought to play a role in initiating the autoimmune process that leads to T1DM. Ongoing research aims to better understand these triggers and how they interact with genetic factors to cause the disease (Gale, T1DM usually presents with a sudden onset of symptoms, including excessive thirst, frequent urination, weight loss, and fatigue. If not treated promptly, it can lead to diabetic ketoacidosis, a serious complication characterized by high blood sugar, ketone production, and acidosis. Long-term complications of poorly managed T1DM include cardiovascular disease, neuropathy, nephropathy, and retinopathy, which can significantly impair quality of life and reduce life expectancy (**Haller et al., 2023**).

Managing T1DM requires а comprehensive approach that includes frequent monitoring of blood glucose levels, insulin administration, a carefully balanced diet, and regular physical activity. Advances in diabetes management technologies, such as continuous glucose monitors (CGMs) and insulin pumps, have significantly improved the lives of those with T1DM, allowing for more precise control of blood glucose levels. Additionally, research is ongoing into potential therapies that could replace or regenerate beta cells, offering hope for a future cure (Vella & Greenbaum, 2023).

Community nurses play a critical role in supporting adolescents with Type 1 Diabetes Mellitus (T1DM) by providing holistic care that integrates medical management with education. They work closely with adolescents and their families to ensure they have a thorough understanding of the disease, including how to manage blood glucose levels, administer insulin, and incorporate a healthy diet and regular physical activity into their lives. This educational component is essential, as it empowers adolescents to take charge of their health and develop the skills needed for lifelong diabetes management (Silva et al., 2023).

In addition to medical care, community nurses offer vital emotional and psychological support to adolescents with T1DM, who may struggle with the daily demands of managing a chronic illness. Adolescence is already a time of significant emotional and psychological change, and the added burden of T1DM can lead to increased anxiety, depression, or feelings of isolation. Community nurses are trained to recognize these challenges and provide counseling, support, and referrals to mental health services when needed. By addressing these emotional needs, community nurses help

adolescents maintain a positive outlook and better adherence to their diabetes management plan (**Johnson & Klein, 2023**).

Advocacy Community nurses serve as advocates and coordinators of care for adolescents with T1DM, ensuring that their needs are met across different environments, such as home, school, and healthcare settings. collaborate with other healthcare They professionals. including endocrinologists, dietitians, and mental health providers, to develop comprehensive care plans tailored to each adolescent's unique needs. Additionally, community nurses work with schools to ensure that students have the necessary accommodations to manage their diabetes safely and effectively during the school day. This coordination and advocacy are crucial in creating a supportive environment that allows adolescents to succeed both academically and socially while managing their condition (Walker et al., 2024).

Significance of the study:

Diabetes mellitus, commonly known as a "silent disease," advances quickly and leads to significant harm to vital organs, making it a significant public health issue due to its devastating consequences. Diabetes patients must prioritize effective self-care management to attain and sustain optimal blood glucose levels (**Baral & Baral, 2023**).

In 2015, the International Diabetes Federation (**IDF**) reported that around 542,000 children between the ages of 0 and 14 were diagnosed with Type 1 Diabetes worldwide .

In Egypt, data are scarce regarding the frequency of Type 1 Diabetes in Adolescents. Nevertheless, International the Diabetes Federation reports that the latest occurrence rate of Type 1 Diabetes in children aged 0 to 14 is 8 per 100,000. In addition, Egypt is ranked among the top 10 countries with the greatest prevalence of diabetes. The IDF reports that in 2021, Egypt had a population of 10.9 million individuals between the ages of 20 and 79 who were diagnosed with diabetes. It is anticipated that this figure will almost double to about 20 million by the year 2024, as estimated by the World Health Organization in 2023.

Methodology of the study Aim of the study.

The study aims to assess knowledge and attitude regarding diabetes type 1 among adolescents in nursing secondary school through the following.

1-Assess self-care knowledge among adolescents regarding diabetes type 1. 2-Assess attitude among adolescents regarding diabetes type1.

Research question:

To fulfill the purposes of the study, the following research questions will be answered.

1-What is the level of knowledge among adolescents regarding diabetes type 1? 3-What is the level of attitude among adolescents regarding diabetes type 1?

I. Technical Design

The technical design includes research design, setting, subject, and tools for data collection.

A-Research design:

The descriptive research study was utilized to achieve the aim of the current study.

B-Setting:

The study was conducted in a nursing secondary school in the village of Nasser and Wasti at Beni-suef City.

C-Subjects:

Sample type: A convenient sample of 267 students attending in 1th, 2th, 3th years at nursing secondary school (Nasser and Wasti) .The duration of the study was six month from the

beginning of july2023 to the end of Desember

2023, an average 2day/week was used in the attitude -----> 75.0% of total attitude score. (17-21). current study.

The sample size was calculated utilizing the Uncertain attitude -----60.0%-75.0% of total attitude score (13-16) following formula.

 $n=N/1+(Ne^{2})$

Where N= 900, e =0.05, n= 267

Date of study: the actual work of this study started and was completed within six months from July 2023 to the end of November 2023

Tool for Data collection

One tool was used to collect data for the current study.

Tool 1-Interviewing questionnaire sheet.

The tool was developed by the investigator

after reviewing the national and international related literature. It included two parts.

Part I; Social demographic data for adolescents.

This part included personnel characteristics: sex, marital status, number of family members, educational level of parents, father's job, mother's job, family income, with whom they live, current school, and residence.

Part II; Adolescent knowledge questionnaire sheet.

The adolescent knowledge questionnaire sheet was developed by the researcher by reviewing related literature. An interview questionnaire sheet was used to assess the knowledge regarding diabetes type 1 among adolescents in nursing secondary schools.

It included 22 multiple-choice questions, the answer to each question was scored as (0) for incorrect answers, (0), for don't know, and (1) for correct answers.

The total knowledge score was calculated as:

Poor -----< 60.0% of total knowledge score (0-13).

Fair ----- 60.0-75.0% % of total knowledge score (14-17).

Good -----> 75.0% of total knowledge score (18-22).

Part III; Adolescent attitude questionnaire sheet.

It is a 3-point Likert scale, it was developed by the researchers, and it is composed (of 7 statements). The participants' responses were scored as (1), for disagree, (2), for uncertain, and (3), for agree.

Negative attitude -----<60.0% of total attitude score (0-12)

Validity:

The study tool was tested for content validity by a panel of five experts from faculties of nursing and, the necessary modification was done accordingly.

Reliability:

Cronbach's Alpha was used to determine the

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internal reliability of the present study tools; it was 0.876 for the knowledge assessment tool, and 0.942 for the attitude Likert scale tool.

Ethical consideration:

Before the study ethical approval opted from the scientific research ethical committee of the faculty of Medicine Beni-surf University, official permission was taken from the authoritative personnel in the mentioned schools and written or oral consent was obtained from all adolescents in nursing schools, the purpose and nature of the study was explained to them before the interview. The investigators emphasized that participation in the study is entirelv voluntary; anonymity and confidentiality were assured through coding the data and they have the right to withdraw at any time.

II-Operational design:

The operational design includes the preparatory phase, pilot study, and fieldwork.

Preparatory phase:

The investigator reviewed current and past of the, local and international related literature and theoretical knowledge of various aspects of the study using books, articles, and the internet to prepare the tools for data collection.

Pilot study:

A pilot will be conducted on 10%(28)of total nursing student at The nursing secondary schools in the villages of Nasser and Wasti Beni-suef city, under the study to assess the feasibility of the study as well as clarity and objective of the tool. The needed modification was incorporated and those subjects were excluded from the actual study sample.

Field work:

Sampling was started and expected to be completed within six months.

The purpose of the study was simply explained to adolescents who agreed to participate in the study before any data collection. The researcher collected data from adolescents. Data collection was done 2 days (a week) by the researcher about knowledge and attitudes regarding diabetes type 1 among adolescents in Nursing Secondary Schools in Beni-surf city. An interviewing questionnaire sheet was filled in and completed by the participants and returned at the same time and the observation chick list was filled by the researcher.

III-Administrative design:

Approval to conduct this study was obtained from the dean of the Faculty of Nursing, Benisuef University, and official permission was obtained from the director of the Training and Schools Department at the Directorate of Health and Population in Beni-suef regarding the adolescent in Out Patient Clinic for whom the was conducted.

IV- Statistical design:

Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 26 for analysis. The P value was set at 0.05. Descriptive statistics tests such as numbers, percentages, and mean standard deviation (\pm SD) were used to describe the quantitative results. The coefficient Correlation r test was utilized to evaluate the association between studied mothers' knowledge and attitude.

Results:

Table (1): Distribution of demographic characteristics of the studied students (n=263).

Demographic characteristics	Item	Frequency	%
Age in years			
	16-	89	33.3
	17-	98	36.7
	18-	80	30.0
	Mean ±SD	16.9	97±0.796
Gender			
	Male	131	49.1
	Female	136	50.9
Residence			
	Rural	116	43.4
	Urban	151	56.6
Academic year	First	89	33.3
	Second	98	36.7
	Third	80	30.0

Table 1: illustrates that more than one-third 36.7% of the studied students were 17 years old, with a mean of 16.97 ± 0.796 , and were in the second academic year. Moreover, more than half of them 50.9%, and 56.6% are female and resident in rural settings respectively.

Variable	Item	Frequency	%
Father education			
	Primary	90	33.7
	Secondary	152	56.9
	University	25	9.4
Mother education			
	Primary	111	41.6
	Secondary	134	50.2
	University	22	8.2
Father occupation			
	Employee	32	12.0
	Free works	235	88.0
Mother Occupation			
_	Housewives	232	86.9
	Free works	35	13.1
Family income			
	Enough	55	20.6
	Not enough	212	79.4
Family history of diabetes			
Mellitus	Yes	92	34.5
	No	175	65.5

Table (2): Distribution of family history of the studied students (n=267).

Table 2 illustrates that more than half 56.9% of the studied students' fathers had a secondary education, half 50.2% of their mothers also had a secondary education, and the majority of the studied students' fathers, 88.0% had free work, and the majority 86.9% of their mothers are housewives. Moreover, 79.4% of them did not have enough family income, and 65.5% of them didn't have a family history of diabetes mellitus.

Item	Yes		ľ	No	Don't know		
	No %		No	%	No	%	
Definition of type I diabetes Mellitus	59	22.1%	84	31.5%	124	46.4%	
Cause of type I diabetes Mellitus	16	6.0%	151	56.5%	100	37.5%	
Diabetes curable with treatment	32	12.0%	165	61.8%	70	26.2%	
Risk factors of DM	32	12.0%	155	58.0%	80	30.0%	

Table (3): Distribution of Type I Diabetes Mellitus general knowledge among the studied students (n=267).

Table 3 illustrated that 22.1% of the studied had a correct answer regarding the definition of type I diabetes Mellitus, and more than half of them, 56.5% had incorrect answers regarding the causes of type I diabetes Mellitus. Moreover, more than half of them had incorrect answers regarding the risk factors of diabetes Mellitus.

Table (4): Distribution of Type I Diabetes Mellitus symptoms knowledge among the studied students (n=267).

Symptoms	Yes		1	No	Don't know	
	No	%	No	%	No	%
Increased thirst	22	8.3%	112	41.9%	133	49.8%
Poor appetite	22	8.2%	229	85.8%	16	6.0%
Frequent urination	12	4.5%	169	63.3%	86	32.2%
Abdominal pain	34	12.7%	188	70.4%	45	16.9%
Palpitation (due to high blood sugar)	42	15.7%	173	64.8%	52	19.5%
Slow healing of cuts and wounds	30	11.2%	158	59.2%	79	29.6%

Table 4 illustrated that 15.7 % of the studied students had a correct answer regarding palpitation as a symptom of type I diabetes Mellitus, and the vast majority 85.8% had incorrect answers regarding poor appetite as a symptom of diabetes. In addition, more than two-thirds of them 70.4% & 63.3% of them had incorrect answers regarding abdominal pain and frequent urination respectively. Moreover, nearly half 49.8% of them don't know that increased thirst is a symptom of diabetes mellitus.

Table (5): Distribution of Type I Diabetes Mellitus treatment knowledge among the studied students (n=267).

Management of disease type 1	Y	es	Ν	No	Don't know	
	No	%	No	%	No	%
Insulin injection	33	12.3%	221	82.8%	13	4.9%
Oral medications	24	9.0%	187	70.0%	56	21.0%
Regular Exercise	32	12.0%	165	61.8%	70	26.2%
Avoiding sugary foods	31	11.6%	154	57.7%	82	30.7%
Regular eating of herbs, ginger, and cinnamon.	21	7.9%	113	42.3%	133	49.8%

Table 5 indicated that 12.0 % of the studied students had a correct answer regarding regular exercises as a treatment of type I diabetes Mellitus, 82.8% and 70.0% of them had incorrect knowledge regarding insulin injection and oral medication for treatment of type I diabetes Mellitus. In addition, nearly half of them don't know that regularly eating herbs, ginger, and cinnamon are used as a treatment for type I diabetes Mellitus.

Item	Y	'es	ľ	No	Don't know		
	No %		No	%	No	%	
Stroke	21	7.9%	228	85.4%	18	6.7%	
Heart attack	12	4.5%	173	64.8%	82	30.7%	
Hepatitis	33	12.3%	174	65.2%	60	22.5%	
Kidney failure	37	13.9%	163	61.0%	67	25.1%	
Arthritis	32	12.0%	127	47.6%	108	40.4%	

Table (6): Distribution of Type I Diabetes Mellitus effect on other body organs knowledge among

the studied students (n=267).

Table 6 illustrated that 13.9 % of the studied students had a correct answer regarding kidney failure as a side effect of type I diabetes Mellitus, in addition, the vast majority 85.4% of them that type I diabetes Mellitus side effects including stroke. On the other hand, 40.4% of them don't know that arthritis is a side effect of diabetes Mellitus.

Table (7): Distribution of Type I Diabetes Mellitus effect diagnostic tests knowledge among the studied students (n=267).

Item	Y	es	Ν	No	Don't know		
	No	%	No	%	No	%	
Measuring urine sugar is the best way to diagnose diabetes	32	12.0%	223	83.5%	12	4.5%	
Measuring blood glucose after fasting is the best way to diagnose diabetes	24	9.0%	171	64.0%	72	27.0%	

Table 7 illustrated that 83.5 % of the studied students had incorrect answers regarding Measuring urine sugar as the best way to diagnose diabetes, and 64.0% of them had incorrect answers regarding measuring blood glucose after fasting as the best way to diagnose diabetes.



Figure (1): percentage distribution of total knowledge score of the studied students.

Figure 1 illustrates that more than one-third of the studied students had a poor level of knowledge, 34.8% of them had a fair level of knowledge score, and only 29.6% of them had a good level of knowledge.

Table (8): Distribution of the studied students?	' attitude regarding type I Diabetes	Mellituseffect
(n=267).		

Item	Disagree		Ne	utral	Aş	gree
	No	%	No	%	No	%
Do you think that controlling glucose with diet alone is superior to controlling glucose with diet and medications?	100	37.5%	81	30.3%	86	32.2%
Can long-term use of metformin cause kidney damage?	104	39.0%	116	43.4%	47	17.6%
Does long-term drug use cause organ failure?	95	35.6%	63	23.6%	109	40.8%
Does insulin cause harmful effects on the body?	68	25.5%	65	24.3%	134	50.2%
Do you think the use of ginger, cinnamon, and fenugreek is better for treating diabetes than prescription drugs?	68	25.5%	98	36.7%	101	37.8%
Do you think that alternative therapies are better than the methods usually prescribed?	51	19.1%	119	44.6%	97	36.3%
Do you think there is no point in trying to get control of your blood sugar well because the complications of diabetes will occur anyway"?	71	26.6%	126	47.2%	70	26.2%

Table 8 illustrates that more than half 50.2% of the studied students agreed that insulin caused harmful effects to the body, and 40.8% of them agreed also that long-term drug use causes organ failure. In addition, 39.0%, &37.5% of them disagreed that long-term use of metformin causes kidney damage and that controlling glucose with diet alone is superior to controlling glucose with diet and medications.





Figure 2 illustrates that nearly half of the studied students had a positive attitude regarding type I diabetes Mellitus, 30.0% of them their attitudes were uncertain, and 22.8% of them had a negative attitude regarding type I diabetes Mellitus.

Table (9): Distribution of relationship	between	studied	students'	demographic	characteristics	and
their total knowledge sore.						

Demographic characteristics	Item		Tot		Chi- square	p- value			
		P	oor]	Fair	Good		iesi	
		No	%	No	%	No	%		
Age in years									
								2.03	>0.05
	16-	35	36.8%	28	30.1%	26	32.9%	2.03	20.05
	17-	36	37.9%	33	35.5%	29	36.7%		
	18-	24	25.3%	32	34.4%	24	30.4%		
Gender									
								0.193	>0.05
	Male	45	47.4%	47	50.5%	39	49.4%		
	Female	50	52.6%	46	49.5%	40	50.6%		
Residence									
								0.959	>0.05
							10 7		
	Urban	45	47.4%	39	41.9%	32	40.5%		
	Rural	50	52.6%	54	58.1%	47	59.5%		
Academic year	First								
		35	36.8%	28	30.1%	26	32.9%	2.03	>0.05
	Second	36	37.9%	33	35.5%	29	36.7%		
	Third	24	25.3%	32	34.4%	24	30.4%	1	

Table 9 indicated that there was no statistically significant relation between the studied students' total knowledge score and their age, gender, residence, and academic year (p-value >0.05) This may be due to that the majority of the studied students had the same curricula contents and are selected by the same criteria to attach the nursing schools.

Variable	Item	Total knowledge score							р-
		Р	oor		Fair	(Good	square	value
		No	%	No	%	No	%	test	
Father									
education	Primary	28	29.5%	36	38.7%	26	32.9%	4.71	>0.05
	Secondary	60	63.2%	50	53.8%	42	53.2%		
	University	7	7.4%	7	7.5%	11	13.9%		
Mother									
education	Primary	34	35.8%	44	47.3%	33	41.8%	5.91	>0.05
	Secondary	55	57.9%	43	46.2%	36	45.6%		
	University	6	6.3%	6	6.5%	10	12.7%		
Father								2.74	>0.05
occupation	Employee	15	15.8%	11	11.8%	6	7.6%		
	Free works	80	84.2%	82	88.2%	73	92.4%		
Mother									<0.05
Occupation	Housewives	90	94.7%	76	81.7%	66	83.5%	8.09	*
	Free works	5	5.3%	17	18.3%	13	16.5%		
Family income									
	Enough	14	14.7%	21	22.6%	20	25.3%	3.29	>0.05
	Not enough	81	85.3%	72	77.4%	59	74.7%	-	
Family history									
of diabetes	Yes	31	32.6%	30	32.3%	31	39.2%	1.14	>0.05
mellitus	No	64	67.4%	63	67.7%	48	60.8%	1	

Fable (10): Distribution of relationship betwee	n studied students	' family history	and their total
knowledge sore.			

Table 10 indicated that there was no statistically significant relation between the studied students' total knowledge score and their father's education, mother's education, father's education, or family income (p-value>0.05). On the other hand, there was a statistically significant relation between their total knowledge score and their mother's occupation (p-value <0.05*).

Demographic	Item	Total attitude score					Chi-	p-value	
characteristics		Neg	ative	Un	certain	Po	sitive	square	
		No	%	No	%	No	%	itsi	
Age in years									
	16		24.404		20.5%	1.7	25.50		
	16-	21	34.4%	23	28.7%	45	35.7%	6.75	>0.05
	17-	27	44.3%	25	31.3%	46	36.5%		
	18-	13	21.3%	32	40.0%	35	27.8%		
Gender									
								0.086	>0.05
	Male	29	47.5%	40	50.0%	62	49.2%	0.000	
	Female	32	52.5%	40	50.0%	64	50.8%		
Residence									
								4.67	>0.05
	Urban	25	41.0%	28	35.0%	63	50.0%		
	Rural	36	59.0%	52	65.0%	63	50.0%		
Academic year	First	21	34.4%	23	28.7%	45	35 7%		
		<i>2</i> 1	57.7/0	25	20.770	т.)	55.170	6.75	>0.05
	Second	27	44.3%	25	31.3%	46	36.5%		
	Third	13	21.3%	32	40.0%	35	27.8%		

Table (11): Distribution of relationship between studied students' demographic characteristics and their total attitude score.

Table 11 indicated that there was no statistically significant relation between the studied students' total attitudes score and their age, gender, residence, and academic year (p-value >0.05) This may be due to that the majority of the studied students had the same curricula contents and are selected by the same criteria to attach the nursing schools.

Table (12): Distribution of relationship between studied students' family history and their total knowledge sore.

Variable	Item	Total attitude score					Chi-	p-value	
		Neg	gative	Uncertain Positive		squar			
		No	%	No	%	No	%	e test	
Father									
education	Primary	23	37.7%	34	42.5%	33	26.2%	8.81	<0.05*
	Secondary	30	49.2%	39	48.8%	83	65.9%		
	University	8	13.1%	7	8.8%	10	7.9%		
Mother									
education	Primary	31	50.8%	38	47.5%	42	33.3%		<0.05*
	Secondary	22	36.1%	36	45.0%	76	60.3%	11.77	
	University	8	13.1%	6	7.5%	8	6.3%		
Father									
occupation	Employee	8	13.1%	11	13.8%	13	10.3%	0.642	>0.05
	Free works	53	86.9%	69	86.3%	113	89.7%		
Mother									
Occupation	Housewives	50	82.0%	72	90.0%	110	87.3%	1.99	>0.05
	Free works	11	18.0%	8	10.0%	16	12.7%	1	

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Family								0.703	
income	Enough	12	19.7%	19	23.8%	24	19.0%		
	Not enough	49	80.3%	61	76.3%	102	81.0%		
Family									>0.05
history of	Yes	28	45.9%	27	33.8%	37	29.4%	5.00	
diabetes mellitus	No	33	54.1%	53	66.3%	89	70.6%		

Table 12 indicated that there was no statistically significant relation between the studied students' total attitude score and their father's education, father's and mother's occupation, or family income (p-value>0.05). On the other hand, there was a statistically significant relation between their total attitude score and their father and mothers' education (p-value <0.05*).

Table (13): Correlation between studied students total knowledge and attitude score

l l	ariables	Knowledge	Attitude	
Knowledge	r	1	.150*	
	p-value		.014	
Attitude	r	$.150^{*}$	1	
	p-value	.014		

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13 indicated that there was a positive association between the studied students' total knowledge and attitude score p-value ($<0.05^*$), which means increased knowledge positively increases attitudes.

Discussion

This chapter discusses the results of the current study, compared them with other related studies, recent literature, and the researcher's interpretations of the current results.

Regarding demographic characteristics of the studied students, this study showed that a third of the students (36.7%) are 17 years old, with an average age of 16.97 ± 0.796 . Also found that the gender distribution is nearly equal, with males at 49.1% and females at 50.9%; the majority of students reside in urban areas (56.6%) compared to rural areas (43.4%), and the students are fairly evenly distributed across the three academic years. These data show that the students come from diverse backgrounds in terms of age, gender, geographic location, and academic year. This diversity provides a solid foundation for analyzing their knowledge and attitudes towards type 1 diabetes.

This study agrees with a study by (Zemba,2023) about Diabetes knowledge and associated factors in adolescents and young adults with type 1 diabetes in Ouagadougou

(Burkina Faso) that mentions the sixty-three participants with a mean age of 19.05 years and a sex ratio (F/M) of 1.17 were included in our study. Females represented 53.97% of participants. Thirty-eight (60.32%) participants had a primary or intermediate school level of education and 8 (12.7%) had a high school level. Fifty (78.24%) participants lived in urban areas and 40 (63.5%) lived with both their two parents.

This study contraindicates with a study from (NCES,2021) indicated a different age distribution among high school students, where the majority are younger than 17 years old, with significant variations depending on the school district Also indicates that gender distribution in some studies shows more pronounced disparities. For instance, certain urban and suburban schools report a higher percentage of female students compared to males. According to the (Pew Research Center, 2022) a substantial number of students in various studies are more evenly split between urban and rural areas, with urban residency not always being the majority.

Related Family History of the studied students indicated that most fathers (56.9%) and mothers (50.2%) have secondary education, the vast majority of fathers (88.0%) are in free business, and mothers (86.9%) are housewives, most families (79.4%) have insufficient income, a large percentage (65.5%) of families have no history of diabetes. This study reflects the educational and occupational status of the parents as well as the financial situation of the student's families. The insufficient income of most families can impact access to healthcare resources and health education, which in turn affects the students' knowledge and attitudes toward diabetes.

This result consisted of a study by (Akter, 2022) about the Knowledge, attitude, and practice of diabetes among secondary school-going children in Bangladesh, which found that most study participants had a family income of ≤ 100 USD per month. However, in terms of their parent's education, the majority had only completed primary school, which also disagrees with this study about Family socioeconomic status and its impact on diabetes management among adolescents. When this study found a significant relationship between higher family income and better diabetes management.

Regarding the distribution of general knowledge about type 1 diabetes among the studied students the current study showed that only 22.1% of students correctly know the definition of type 1 diabetes, and the vast majority have incorrect information about the causes and treatment of diabetes. This means that The results show a significant lack of general knowledge about type 1 diabetes among students, indicating a need for more effective educational programs in schools to promote a proper understanding of this health condition. this finding matches with a study bv (Gazzaz,2020) about Knowledge, attitudes, and practices regarding diabetes mellitus among university students in Jeddah, Saudi Arabia, indicated that among their students, only 186 (13%) had good knowledge scores, while 569 (39.8%) and 673 (47.1%) had moderate and poor knowledge scores, respectively.

This study contraindicated with a study by (**Akter,2022**) this study reported a higher percentage of adolescents correctly identifying type 1 diabetes when the majority of responders (79.34%) reported that they had heard of diabetes, however, only 45% knew that diabetes can cause blood glucose levels to rise.

The current study indicates that only a small percentage of students know the main symptoms of diabetes, such as increased thirst and frequent urination. So These results indicate that students lack basic knowledge about the symptoms of type 1 diabetes, which can affect their ability to recognize and manage the symptoms effectively.is consistent with the study by (Sheikh et al., 2020) about awareness of diabetes mellitus among the adolescent age group in Jeddah City, Saudi Arabia which found that lack of knowledge of diabetes symptoms.

This study does not agree with a study by_(**O'Brien et al.,2019**) about the Recognition of diabetes symptoms among adolescents in a public school setting this indicated higher levels of symptom recognition among students.

This study proved that only 12% know that regular exercise is part of disease management. The findings emphasize the need for better education of students about the treatment options for type 1 diabetes, including medication, diet, and exercise. This study matches with a study by Harrison et al. (2021) about Physical activity knowledge and behavior in adolescents with type 1 diabetes: An exploratory study indicated that the majority of participants displayed significant gaps in their understanding of the recommended levels of physical activity for managing type 1 diabetes. Many were unaware of how different types and intensities of exercise could impact their blood glucose levels.

This study is not consistent with a study by (**Palma et al.,2018**) about the evaluation of the Level of Knowledge and Attitude of Young People with Diabetes Mellitus Type It is worth mentioning that 62% of the investigated individuals reported being physically active, and performing regular exercises supervised by physiotherapists, also with a study by (**Ryninks, et al.,2015**) about Attitudes to exercise and diabetes in young people with type 1 diabetes mellitus this study reported in this paper show that young people with Type 1 felt that exercising helped them manage their diabetes, and had a beneficial psychological and physical impact on their bodies.

The current study shows that limited knowledge about the impact of diabetes on various body organs such as the kidneys and heart study students. This means that a lack of awareness about the effects of diabetes on overall health can lead to neglecting necessary increasing the medical care. risk of complications, this matched with a study by (Silverstein& Klingensmith.,2018) about understanding diabetes complications in adolescents that indicates that many adolescents with diabetes may not realize that chronic hyperglycemia can damage not just the pancreas but also other organs like the kidneys and eyes. Contraindicated with a study done by (Karam& Alhazmi.,2020) about adolescent knowledge of diabetes complications this study found a higher level of awareness about diabetes complications among adolescents.

Related to knowledge about diagnostic tests for type 1 diabetes among the Studied Students. This study indicated that ⁷/⁴, ^o have incorrect knowledge about the best diagnostic methods for diabetes. The results highlight the urgent need to improve awareness of the correct diagnostic methods for diabetes among students to ensure early diagnosis and proper disease management, this result agrees with a study by (Sharma & Verma., 2020) about Awareness of diabetes diagnostic tests among school students found that a significant portion of school students lacked sufficient knowledge about diabetes diagnostic tests. Only about 30% of the participants were aware of common tests like fasting blood glucose and HbA1c.

Contraindicated with a study by Chauhan, Kim & Shashank (2019) about Knowledge of diabetes diagnostic tests among high school students in urban areas this study reported better knowledge about diagnostic tests among students in urban areas.

Regarding the distribution of attitudes of the studied students towards type 1 diabetes, this study found that more than half of the students believe that insulin causes harmful effects on the body. The results reflect negative attitudes towards conventional treatments for diabetes, indicating the necessity to improve awareness about the importance and safety of medications and treatments. Agree with the finding (**Cinar & Kose.,2018**) about adolescent attitudes towards insulin therapy his belief can stem from misconceptions about insulin, such as fears of dependency or concerns about weight gain, which are common among adolescents. But not match with a study by **Çinar & Kose** (2021) about Perceptions of insulin therapy among adolescents with type 1 diabetes, this study found more positive attitudes towards insulin therapy among adolescents.

For Relationship the between Demographic Characteristics and Overall Knowledge and Attitudes Scores, this study indicated that No statistically significant relationship between demographic characteristics and students' knowledge or attitudes towards diabetes. So These results suggest that demographic factors such as age, gender, and geographic location do not significantly influence students' knowledge and attitudes towards type 1 diabetes, reinforcing the need for comprehensive educational programs that. In the study by (Abdulrahman and Alkhashan., 2017) about Demographic factors and their influence on diabetes knowledge among adolescents the researchers found no significant relationships between demographic factors (such as age, gender, and socioeconomic status) and adolescents' knowledge or attitudes toward diabetes. This finding suggests that, regardless of their background, adolescents may have similar levels of understanding and attitudes about diabetes management. But disagree with a study by Hassan, et al. (2020). A bout demographic factors affecting diabetes knowledge among diabetic patients in Malaysia, the authors found that higher education levels and younger age groups correlated with better diabetes knowledge and positive attitudes toward disease management.

Related to the relation between family history and knowledge score, the study indicates that there is no significant relationship between students' total knowledge scores and their father's education, mother's education, father's occupation, or family income. This suggests that these specific aspects of family history do not directly influence the knowledge acquisition of the students in this context. However, a significant relationship is observed with the mother's occupation. This could imply that mothers' occupations may have a unique influence on the learning environment or educational support at home. For instance, mothers in professional or educational fields might be more likely to provide educational resources or emphasize the importance of knowledge, positively impacting their children's knowledge scores.

This study agrees with **Davis-Kean &** (2021) study about Family influences on adolescent academic achievement, this research indicates that maternal educational background and employment significantly correlate with adolescents' academic performance and knowledge scores. Not match Roy & Lloyd (2019) about "Knowledge of long-term diabetes complications among adolescents. This research highlighted the significant role of family income and parental education in influencing diabetes knowledge.

Regarding demographic characteristics and attitude, the study shows a lack of a significant relationship between students' total attitude scores and demographic factors such as age, gender, residence, and academic year suggesting that these factors do not majorly influence students' attitudes. This homogeneity in attitude scores may be attributed to the standardized curricula and selection criteria in nursing schools, which likely foster similar educational experiences and environments across different demographic groups. This standardization can lead to uniformity in attitudes towards their studies and profession among the students. This study supported by (Abdulrahman and Alkhashan., 2017) this study supports the finding that demographic characteristics do not significantly impact attitudes towards diabetes. Not the same as the study by Mackey & Streisand, (2020) about symptom recognition and management in adolescents with type 1 diabetes, this study found that demographic characteristics such as age and gender did influence attitudes and symptom recognition.

For family history and attitude scores the study indicated that the significant relationship between students' total attitude scores and both their father's and mother's education highlights the impact of parental education on shaping students' attitudes. Parents with higher education levels may install positive attitudes towards education and professional development in their children. They might encourage critical thinking, resilience, and a positive outlook toward learning and career aspirations. Conversely, the absence of a significant relationship between father's occupation, mother's occupation, and family income suggests that these factors do not have a direct influence on students' attitudes. This finding could indicate that the educational

The study agrees with Choi& Kim (2023) about Examining the Influence of Parental Education on Children's Motivational Beliefs, this research emphasizes the significant effect of parental education on children's educational attitudes and motivation, finding no noteworthy correlations with parental occupations or family income. But not agree with Smith & Brown, (2023) about the Interplay of Socioeconomic Status and Family Dynamics on Student Attitudes, this research highlights how family income and parental involvement, influenced by occupation, can affect children's educational attitudes. The study concludes that while parental education is important, aspects of parental occupation and the overall family economic context can also significantly shape children's attitudes toward education. The environment provided by the parents, rather than their occupation or income level, plays a more crucial role in shaping students' attitudes.

The findings from this study indicate a statistically significant positive correlation between the student's knowledge and their attitudes related to type 1 diabetes mellitus. With a correlation coefficient of 0.150 and a pvalue of 0.014, the data suggest that as students' knowledge levels increase, their attitudes also tend to improve. This aligns with existing literature that underscores the importance of knowledge in shaping attitudes. The significance level (p < 0.05) confirms that the observed association is not due to chance, reinforcing the notion that educational interventions aimed at increasing knowledge can effectively enhance students' attitudes. This is particularly relevant in educational settings where positive attitudes are crucial for effective learning and engagement.

This finding matches with a study by **Schneider** & **Preckel (2017) about** Variables Associated with Students' Attitudes toward School, this

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meta-analysis examined numerous studies and found a consistent positive correlation between knowledge and students' attitudes toward learning. The review concluded that interventions aimed at increasing subject knowledge often lead to improved attitudes, enhancing overall educational experiences. But with Aikens et al. not (2022)about Associations between Diabetes Distress and Health Outcomes among Adults with Type 1 Diabetes, this research shows that individuals with high diabetes knowledge often report significant diabetes distress, which can lead to disengagement from self-care practices. A patient might know the steps to manage their blood sugar effectively but still feel overwhelmed and develop a negative attitude towards daily management.

Conclusion

As pointed the current study results showed that, based on the study's findings, it could be concluded that; the vast majority of the studied adolescents had poor knowledge regarding nursing knowledge of type 1 diabetes mellitusrelated definition, symptoms, diagnosis, complications, and management of it. Also, thirty percent of the studied adolescents had an incompetent level of attitude. Also, there was a statistically significant relation between the studied students' total knowledge and attitude scores.

RECOMMENDATIONS

The subsequent recommendations were offered based on the outcomes of the present study:

- Periodical educational training programs and workshops should be conducted for adolescents at secondary nursing school about diabetes mellitus type 1 to raise and update adolescents 'knowledge and practices.
- Future research has to be done to enhance community nurses' expertise and skills in caring for adolescents with DM1.
- Manual handbooks containing essential nursing procedures regarding the care of adolescents with DM1.

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