

## Effect of Health Educational Program Regarding Nephropathy for Mothers of Children Suffering From Diabetes Mellitus at Assiut City

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### Abstract:

**Background:** The health burden of diabetic nephropathy is exponentially increased by the constant and alarming increase of the incidence of both Type 1 and 2 diabetes mellitus. **Aim:** The study aimed to evaluate the effect of health educational program regarding nephropathy for mothers of children suffering from Diabetes Mellitus at Assiut City. **Subjects and Method:** Quasi-experimental (Pre-post-test) design implemented for 100 mothers of diabetic school-age children. Two tools included: **Tool I: Part one:** Personal and clinical data of children. **Part two:** Personal data of mothers. **Tool II: Part one:** Mothers' knowledge. **Part two:** Mothers' health-related practices. **Results:** Only 20% of school-age children's mothers had satisfactory knowledge regarding diabetic nephropathy in pretest. While raised significantly to 96% and 93% in posttest 1 and 2. Moreover, 35% of school-age children's mothers had satisfactory health-related practices regarding diabetic nephropathy in pretest. Whereas improved significantly to 82% and 91% in posttest 1 and 2. **Conclusion:** There was a significant improvement in the school-age children's mothers' knowledge and health-related practices regarding diabetic nephropathy after the educational program implementation. **Recommendations:** Continuing educational programs are needed to improve mothers' knowledge and practices toward better control of diabetic children.

**Keywords:** Diabetes, Educational program, Nephropathy, Mothers & School-age children.

### Introduction:

Type 1 Diabetes Mellitus (T1DM) is the most prevalent form of Diabetes Mellitus (DM) in children and adolescents, but the prevalence of type 2 in these age groups is currently increasing worldwide. One of the main challenges of T1DM or even T2DM is the development of Diabetic Nephropathy (DN) (El-Sayed, 2014 & Uwaezuoke, 2015).

Diabetic Nephropathy (DN) is one of the most predominant complications of diabetes. With the global epidemic of DM, DN has become an essential clinical and public health problem, with approximately one-third of children suffering from this long-term complication of diabetes. "DN is a clinical syndrome characterized by persistent albuminuria (>300 mg/d or 200µg/min) confirmed on at least two occasions 3 to 6 months apart, progressive decline in Glomerular Filtration Rate (GFR) and hypertension" (Reutens and Atkins, 2011 & Zemichea et al., 2020).

Both tight glycemic control and intensive control of elevated blood pressure have a significant impact on the prevention and progression of DN. The importance of prevention cannot be overemphasized

as soon as obvious nephropathy is present; development cannot be stopped but only delayed. It is much more effective to screen for early nephropathy with sensitive tests for microalbuminuria to prevent the earliest stages of renal damage by tight glycemic control and control of hypertension. Clinical trials have consistently demonstrated that good glycemic control is associated with long-lasting decreased risk for clinical and histological changes of DN (Uwaezuoke, 2015).

Mothers have a significant role in delivering home-based intervention for their children with diabetes, so mother-centered empowerment programs will help mothers to improve disease control, better management and improve physical and mental functions of their children and prevention of disease complications (Bansal et al, 2018 & Abdalla et al, 2020).

Pediatric and community health nurse plays a great role in the prevention and intervention of DN for children with DM. This role can be achieved through raising the awareness of diabetic children's mothers regarding DN including its complications and effect on their children's health. The interventions can be divided into those that prevent the onset of

complications (primary prevention) and those that The goal of a prevention strategy involves changing potentially modifiable risk factors: Optimizing blood glucose control, encouraging a healthy diet, controlling blood pressure and encouraging healthy exercise (Donaghue et al., 2007).

### Significance of the study:

Type 1 Diabetes Mellitus is one of the most common chronic diseases affecting children and adolescents. Recent studies reported that the incidence and prevalence of T1DM in children and adolescents in three Egyptian governorates (El-Fayoum, North Sinai, and Suez) were 0.7/1000 prevalence rate and 4.01/100 000 incidence rate. Also, a study conducted in Menoufia Governorate reported that the prevalence rate of juvenile DM among school-age children was 3.75/1000 (Hassan et al, 2019).

Diabetic nephropathy is the most serious complication of DM which leads to end-stage renal failure and other complications of DM. The prevalence of DN is still rising dramatically all over the world causing increased morbidity and mortality disproportionately greater in patients having diabetes from the youngest ages. Many educational programs or interventions concentrate on preventing complications and increasing awareness of already established diseases but few studies implemented to delay the progress of the disease (Afkarian et al., 2013, Afkarian, 2015, Hints et al., 2017 & Zemichea et al., 2020).

### Aim of the study:

The study aimed to evaluate the effect of health educational program regarding nephropathy for mothers of children suffering from diabetes mellitus at Assiut City.

### Research hypothesis:

**Null Hypothesis:** The educational program doesn't improve the knowledge and practices of school-age children's mothers regarding diabetic nephropathy.

**Alternative Hypothesis (H1):** The educational program is expected to improve knowledge and practices of school-age children's mothers regarding diabetic nephropathy.

### Subjects and Method:

**Research design:** A quasi-experimental (pre-post-test) research design was used in the present study

**Setting:** This research work was conducted at Pediatric Endocrine Out-Patient Clinic and Unit in Assiut University Children's Hospital. This hospital is providing the needed health care services for all children from Upper-Egypt Governorates.

### Sampling and sample size estimation:

A convenience sample of 100 mothers of school-age children who are medically diagnosed with diabetes

slow or halt their progress (secondary intervention) mellitus was included. The sample was calculated by using power analysis according to the population flow at a confidence interval of 95% with precision levels of 5% and  $p \leq 0.05$ . The study included mothers who agreed to participate in the study and had children with the following criteria:

1. Age from 6-12 years old.
2. With a confirmed diagnosis of DM.
3. Free of any mental retardation, congenital anomalies, disability or any other chronic disease.
4. Both genders.

### Tools of the study: Two Instruments were applied in this research work:

**Tool I:** A designed direct interviewing form established by the investigators as created after an extensive review of related writings and consultation of the experts which composed of two parts:

**Part one: Personal and clinical data of children** as; age, sex, birth order, school level, number of other siblings, child's age at disease onset (years), type of diabetes, positive family history of diabetes, positive family history of renal diseases, perform kidney function tests, child's weight, height, Body Mass Index (BMI)=weight (kg)/ height (m<sup>2</sup>) and blood pressure.

**Part two: Personal data of mothers** such as age; education level, occupation, residence and means of knowledge concerning diabetic nephropathy.

**Tool II: A structured interviewing form regarding mothers' knowledge and health-related practices regarding diabetic nephropathy:** It was adapted after examine of the scientific writings by Mukhlif and Khatam (2016), Khider et al., (2017), Sarika, (2017), Abolwafa; Hossein (2018) & Diong et al., (2019); beside pediatric textbooks. It included two parts:

**Part one: Knowledge assessment form:** This questionnaire consisted of 15 questions: Definition of diabetic nephropathy, causes, early signs and symptoms, examinations made for the diseased child, complications, regimen, medications, risk factors, side effects of medications used in treatment, early signs of infection, what leaks in a large amount into the urine, regular follow-up measures to detect nephropathy and prevention against nephropathy.

### Scoring system:

**Scoring system for mothers' knowledge:** It was categorized in corresponding to the elements of the interviewing form; mothers' replies were appraised through a correct responses sheet arranged by the researchers. The correct response scored (2) and the incomplete answer scored (1), while the wrong answer scored (0). The total score knowledge was 30. The total mothers' knowledge of fewer than 50%

(<15) was regarded as unsatisfactory while 50% and above (15-30) was regarded as satisfactory.

**Part two: Health-related practices form:** This questionnaire contained six questions that covered the reported practices regarding the management of DN like as Overall hygienic acts, consistent check-ups (evaluating body mass index by measuring weight (kg)/ height (m<sup>2</sup>), intake and output, measuring body temperature, blood pressure and examine of proteinuria), drug administered, follow-up of proper nourishment and psychological support of the child.

#### Scores classification:

**Scoring classification for mothers regarding their reported health-related practices about DN:** It was grouped according to the points of the form; mothers' answers were assessed by the correct responses model constructed by the researchers. The answer is reported done completely was taken two scores, done incomplete answer was taken one score and not done taken zero. The total score of mothers' reported health-related practices about DN was 12 scores. The total mothers' reported health-related practices if less than 50% (<6) was considered as not done while the score of 50% and more (>6-12) was considered as done.

#### Method of data collection:

- A certified agreement was taken from the Dean of Faculty of Nursing to Assiut University Children Hospital's Manager and Endocrine Unit Head and Outpatient Clinic Manager to gather the information after explaining the work purpose and nature.
- A designed interview form was established by the researchers by using the available scientific papers.
- The **validity** index of the form was judged by a jury of five university professors in the field of Pediatric and Community Health Nursing. It was 0.87 for tool one and 0.88 for tool two. Also, **Tools reliability** using Cronbach's Alpha test was done for the used tools and it was found 0.66 for tool one and 0.75 for tool two.
- The ethical agreement was gotten from the Ethical Committee at the Faculty of Nursing - Assiut University. The reason and type of the research were explicated to the children's mothers. Correspondingly, the children and their mothers were notified that they can approve or not take part in the research. Oral consent was assured to share in the study by every mother and they were told that the data acquired would be private and were handled only for the study.
- A pilot study was performed on 10% (10) of the studied children's mothers to check the simplicity and comprehensibility of the tool and to calculate the time needed for filling the form. Minor modifications were done based on the pilot study results. The pilot study sample was excluded from

the study sample because there were corrections and modifications.

- **The educational program:** It is designed by the researchers depending on the pertinent literary texts. The goal of this program was to enhance the knowledge and practices of school-age children's mothers regarding DN. **It was applied in four phases as the following:**

**Assessment phase:** The researchers assessed the mother's and children's personal data and medical profiles of the children as; age sex, mothers' level of education...etc.

**Planning phase:** This phase included the arrangement for the conduction of the program such as Teaching place, sessions, audiovisual aids, handouts, etc.

- **Teaching Time:** The time of the program is decided according to the working time of the outpatient clinic.

- **Teaching place:** This work was conducted in the Endocrine Pediatric Out-Patient Clinic and Unit in Assiut University Children's Hospital.

- **Teaching methods and materials:** The researchers used lectures and discussion as a method of teaching and giving booklet handouts which were distributed to every mother at the end of the program.

- **Sessions:** The contents of the program were divided into two sessions: It was composed of teaching the mothers of school-age children concerning several aspects: e.g. overview of the disease, definition of DN, the effect of diabetes on the kidneys, symptoms of renal impairment, when to see a doctor, causes of DN, risk factors, diagnosis, treatment, how to live with DN, prevention of DN, Health-related practices regarding DN like as Sanitary measures, consistent check-up as (evaluating weight, intake and output, measuring temperature.....etc.

**Implementation phase:** The educational program was conducted for nine months; every mother took two sessions for two days to complete the program contents.

**Evaluation stage:** During this phase, the mothers' knowledge and health-related practices were assessed two times after one week and one month of the pretest to evaluate the effect of the education program.

#### Fieldwork:

The data were collected for nine months; from the 1st of August, 2020 to January, 2021. The investigators met the mothers in the Endocrine Pediatric Out-Patient Clinic and Unit at Assiut University Children's Hospital. They presented themselves to the participated mothers and described the rationale and nature of the research during the meeting. The pretest was done through two meetings. In the first; the researchers filled out the structured form. In the

second; the researchers explicated the educational program contents and contributed a handout booklet for the participated mothers.

About 2-3 mothers were interviewed/day two times/week. The needed time for completing all items in the form was about 20-30 minutes governed by the mothers' replies. The program contents were covered in the booklet which enclosed images, posters and PowerPoint in students' lessons room in the out-patient clinics. The estimated time to complete the post-test form was about 20-30 minutes. The post-test was done two times for mothers: After one week and one month of the pretest during their children's

follow-up. Only the full completed post-test questionnaires were included in the research with the exclusion of the incomplete.

#### Statistical design:

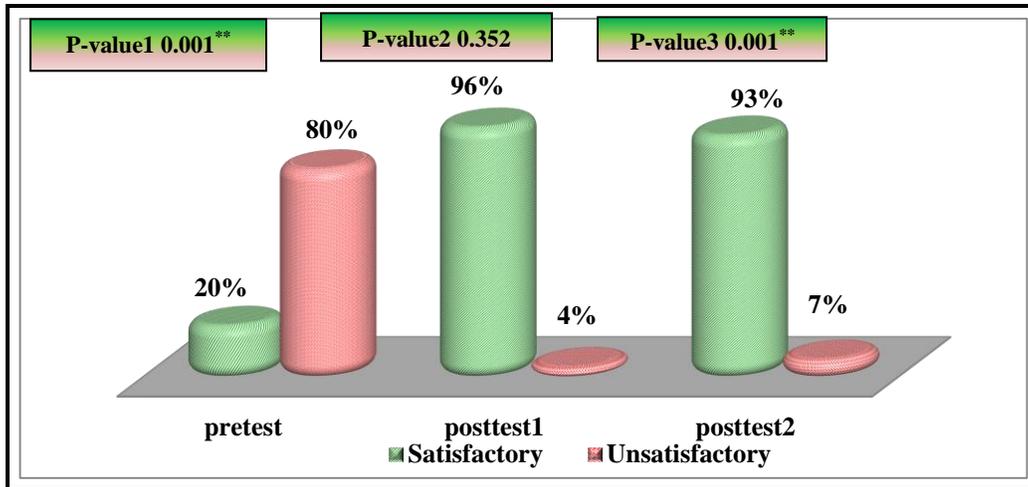
Data analysis was performed using SPSS 20 statistical software. The qualitative variables were described using frequency and percentages and quantitative variables were described using range, mean and standard deviation. Chi-square and McNemar test was used. P-value <0.05 was considered significant and highly significant if P value <0.01.

### Results:

**Table (1): Relation between level of knowledge regarding diabetic nephropathy among school-aged children's mothers and their personal characteristics in pretest, posttest1 and 2**

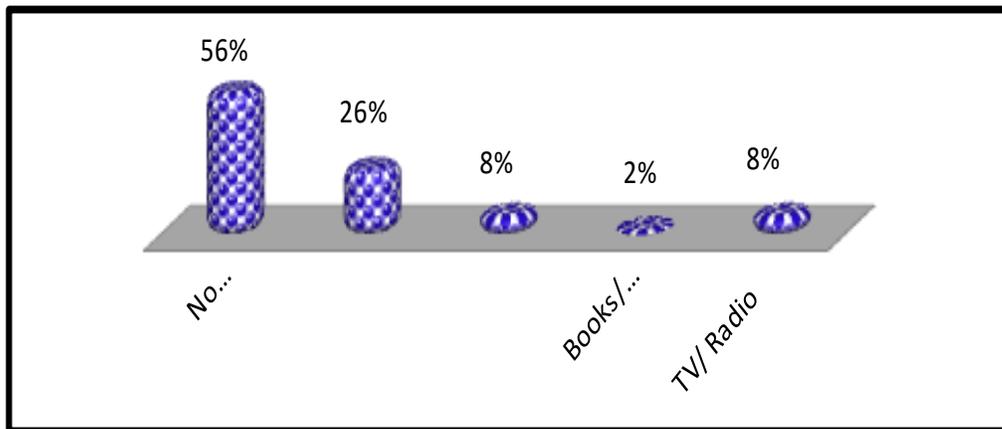
Mothers' characteristics	Level of mothers' knowledge in pretest		P-value 1	Level of mothers' knowledge in posttest1		P-value 2	Level of mothers' knowledge in posttest2		P-value 3
	Sufficient (20)	Insufficient (80)		Sufficient (96)	Insufficient (4)		Sufficient (93)	Insufficient (7)	
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)	
<b>Mother's Age</b>			<b>0.009**</b>			<b>0.729</b>			<b>0.728</b>
20-29 years	2(10.0)	32(40.0)		32(33.3)	2(50.0)		31(33.3)	3(42.9)	
>29-39 years	18(90.0)	42(52.5)		58(60.4)	2(50.0)		56(60.2)	4(57.1)	
> 39 years	0(0.0)	6(7.5)		6(6.3)	0(0.0)	6(6.5)	0(0.0)		
<b>Education level</b>			<b>0.001**</b>			<b>0.427</b>			<b>0.426</b>
Read & write	6(30.0)	54(67.5)		56(58.3)	4(100.0)		54(58.1)	6(85.7)	
Secondary	10(50.0)	4(5.0)		14(14.6)	0(0.0)		13(14.0)	1(14.3)	
University	2(10.0)	12(15.0)		14(14.6)	0(0.0)		14(15.1)	0(0.0)	
Postgraduate	2(10.0)	10(12.5)		12(12.5)	0(0.0)	12(12.9)	0(0.0)		
<b>Occupation</b>			<b>0.758</b>			<b>0.451</b>			<b>0.311</b>
Working	2(10.0)	10(12.5)		12(12.5)	0(0.0)		12(12.9)	0(0.0)	
Housewife	18(90.0)	70(87.5)		84(87.5)	4(100.0)	81(87.1)	7(100.0)		
<b>Residence</b>			<b>0.482</b>			<b>0.251</b>			<b>0.123</b>
Rural	14(70.0)	62(77.5)		72(75.0)	4(100.0)		69(74.2)	7(100.0)	
Urban	6(30.0)	18(22.5)		24(25.0)	0(0.0)	24(25.8)	0(0.0)		

(\*\*) Highly statistically significant difference



P-value 1 between mother total knowledge in pretest and posttest1  
 P-value 2 between mother total knowledge in posttest1 and posttest2  
 P-value 3 between mother total knowledge in pretest and posttest2

Figure (1): Total knowledge regarding diabetic nephropathy among school-aged children's mothers in pretest, posttest1 and 2



(\*\*) highly statistically significant  $p < 0.01$

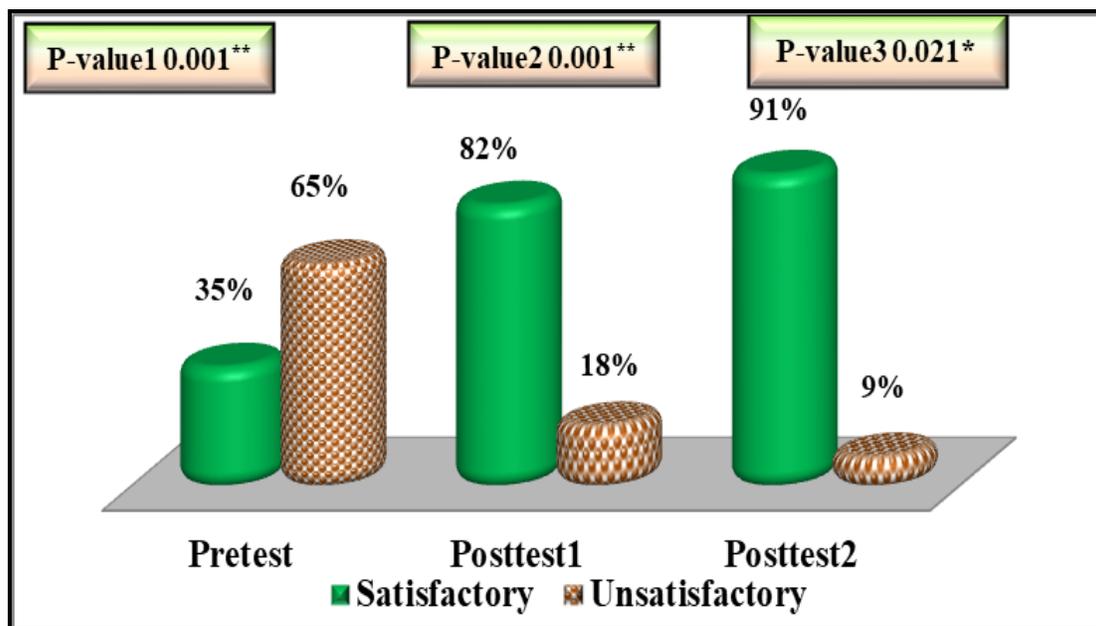
Figure (2): Sources of knowledge regarding diabetic nephropathy among school-aged children's mothers

Table (2): Relation between level of mothers' knowledge regarding diabetic nephropathy and children's personal characteristics in pretest, posttest1 and 2

Children's characteristics	Level of mothers' knowledge in pretest		P-value 1	Level of mothers' knowledge in posttest1		P-value 2	Level of mothers' knowledge in posttest2		P-value 3
	Sufficient (20)	Insufficient (80)		Sufficient (96)	Insufficient (4)		Sufficient (93)	Insufficient (7)	
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)	
<b>Child's age:</b>			<b>0.437</b>			<b>0.733</b>			<b>0.519</b>
6-8	8(40.0)	26(32.5)		33(34.4)	1(25.0)		31(33.3)	3(42.9)	
>8-10	8(40.0)	26(32.5)		33(34.4)	1(25.0)		33(35.5)	1(14.3)	
>10-12	4(20.0)	28(35.0)		30(31.3)	2(50.0)	29(31.2)	3(42.9)		
<b>Child's sex:</b>			<b>0.018*</b>			<b>0.759</b>			<b>0.297</b>
Male	2(10.0)	30(37.5)		31(32.3)	1(25.0)		31(33.3)	1(14.3)	
Female	18(90.0)	50(62.5)		65(67.7)	3(75.0)	62(66.7)	6(85.7)		

Children's characteristics	Level of mothers' knowledge in pretest		P-value 1	Level of mothers' knowledge in posttest1		P-value 2	Level of mothers' knowledge in posttest2		P-value 3
	Sufficient (20)	Insufficient (80)		Sufficient (96)	Insufficient (4)		Sufficient (93)	Insufficient (7)	
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)	
<b>Birth order:</b>									
The first	2(10.0)	10(12.5)	<b>0.574</b>	12(12.5)	0(0.0)	<b>0.190</b>	12(12.9)	0(0.0)	<b>0.568</b>
The second	6(30.0)	34(42.5)		40(41.7)	0(0.0)		38(40.9)	2(28.6)	
The third	8(40.0)	20(25.0)		26(27.1)	2(50.0)		25(26.9)	3(42.9)	
The fourth	4(20.0)	16(20.0)		18(18.8)	2(50.0)		18(19.4)	2(28.6)	
<b>School level:</b>									
Primary	20(100.0)	78(97.5)	<b>0.475</b>	94(97.9)	4(100.0)	<b>0.771</b>	91(97.8)	7(100.0)	<b>0.695</b>
Preparatory	0(0.0)	2(2.5)		2(2.1)	0(0.0)		2(2.2)	0(0.0)	
<b>Number of siblings:</b>									
Non	0(0.0)	2(2.5)	<b>0.584</b>	2(2.1)	0(0.0)	<b>0.445</b>	2(2.2)	0(0.0)	<b>0.513</b>
One	4(20.0)	10(12.5)		14(14.6)	0(0.0)		14(15.1)	0(0.0)	
Two	10(50.0)	36(45.0)		45(46.9)	1(25.0)		43(46.2)	3(42.9)	
Three	6(30.0)	22(27.5)		25(26.0)	3(75.0)		24(25.8)	4(57.1)	
Four	0(0.0)	6(7.5)		6(6.3)	0(0.0)		6(6.5)	0(0.0)	
Fifth	0(0.0)	4(5.0)		4(4.2)	0(0.0)		4(4.3)	0(0.0)	
<b>Child's BMI mean and SD</b>	18.6±2.91	17.8±2.96	<b>0.044*</b>	17.9±2.98	16.7±1.25	<b>0.954</b>	17.9±2.98	16.7±1.26	<b>0.667</b>

(\*) Statistically significant difference  $p < 0.05$



P-value 1 between mother total knowledge in pretest and posttest1  
 P-value 2 between mother total knowledge in posttest1 and posttest2  
 P-value 3 between mother total knowledge in pretest and posttest2  
 (\*\*) highly statistically significant  $p < 0.01$

Figure (3): Total mothers' health-related practices regarding diabetic nephropathy in pretest, posttest1 and 2

**Table (3): Relation between total mothers' health-related practices regarding diabetic nephropathy and their personal characteristics in pre, posttest1 and posttest2**

Mothers' characteristics	Total practices in pretest		P-value1	Total practices in posttest1		P-value2	Total practices in posttest2		P-value 3			
	Done (35)	Not done (65)		Done (82)	Not done (12)		Done (91)	Not done (9)				
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)				
<b>Mother's Age:</b> 20-29 years >29-39 years > 39 years	10(28.6) 25(71.4) 0(0.0)	24(36.9) 35(53.8) 6(9.2)	<b>0.088</b>	27(32.9) 51(62.2) 4(4.9)	7(38.9) 9(50.0) 2(11.1)	<b>0.478</b>	32(35.2) 53(58.2) 6(6.6)	2(22.2) 7(77.8) 0(0.0)	0.468			
<b>Education level:</b> Read & write Secondary University Postgraduate	11(31.4) 7(20.0) 12(34.3) 5(14.3)	49(75.3) 7(10.8) 2(3.1) 7(10.8)		<b>0.002**</b>	49(59.8) 13(15.9) 14(17.1) 6(7.3)		11(61.1) 1(5.6) 0(0.0) 6(33.3)	<b>0.006**</b>		53(58.2) 13(14.3) 14(15.4) 11(12.1)	7(77.8) 1(11.1) 0(0.0) 1(11.1)	0.578
<b>Occupation:</b> Working Housewife	4(11.4) 31(88.6)	8(12.3) 57(87.7)			<b>0.781</b>		6(7.3) 76(92.7)			6(33.3) 12(66.7)	<b>0.002**</b>	
<b>Residence:</b> Rural Urban	20(57.1) 15(42.9)	61(86.2) 9(13.8)	<b>0.002**</b>			63(76.8) 19(23.2)	13(72.2) 5(27.8)		<b>0.679</b>	68(74.7) 23(25.3)		

(\*\*) highly statistically significant difference

**Table (4): Relation between total mothers' health-related practices regarding diabetic nephropathy and children's personal characteristics in pre, posttest1 and 2**

Children's characteristics	Total practices in pretest		P-value 1	Total practices in posttest1		P-value 2	Total practices in posttest2		P-value 3			
	Done (35)	Not done (65)		Done (82)	Not done (12)		Done (91)	Not done (9)				
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)				
<b>Child's age:</b> 6-8 >8-10 >10-12	13(37.1) 8(22.9) 14(40.0)	21(32.3) 26(40.0) 18(27.7)	<b>0.202</b>	31(37.8) 25(30.5) 26(31.7)	3(16.7) 9(50.0) 6(33.3)	<b>0.165</b>	33(36.3) 30(33.0) 28(30.8)	1(11.1) 4(44.4) 4(44.4)	<b>0.314</b>			
<b>Child's sex:</b> Male Female	9(25.7) 26(74.3)	23(35.4) 42(64.6)		<b>0.323</b>	27(32.9) 55(67.1)		5(27.8) 13(72.2)	<b>0.672</b>		31(34.1) 60(65.9)	1(11.1) 8(88.9)	<b>0.159</b>
<b>Birth order:</b> The first The second The third The fourth	4(11.4) 13(37.1) 7(20.0) 11(31.4)	8(12.3) 27(41.5) 21(32.3) 9(13.8)			<b>0.181</b>		11(13.4) 35(42.7) 22(26.8) 14(17.1)			1(5.6) 5(27.8) 6(33.3) 6(33.3)	<b>0.289</b>	
<b>School Level:</b> Primary Preparatory	33(94.3) 2(5.7)	65(100.0) 0(0.0)	<b>0.052*</b>	80(97.6) 2(2.4)		18(100.0) 0(0.0)	<b>0.503</b>	89(97.8) 2(2.2)	9(100.0) 0(0.0)	<b>0.653</b>		
<b>Number of siblings:</b> Non One Two Three Four Fifth	0(0.0) 1(2.9) 21(60.0) 11(31.4) 0(0.0) 2(5.7)	2(3.1) 13(20.0) 25(38.5) 17(26.2) 6(9.2) 2(3.1)		<b>0.035*</b>		0(0.0) 12(14.6) 40(48.8) 21(25.6) 5(6.1) 4(4.9)		2(11.1) 2(11.1) 6(33.3) 7(38.9) 1(5.6) 0(0.0)	<b>0.037*</b>			2(2.2) 13(14.2) 43(47.3) 23(25.3) 6(6.6) 4(4.4)
<b>Child's BMI mean and SD:</b>	16.9±2.89	18.4±2.85	<b>0.019*</b>		17.8±2.97	18.2±2.87	<b>0.615</b>	17.8±2.97		18.9±2.57	<b>0.924</b>	

(\*) Statistically significant difference  $p < 0.05$

**Table (5): Relation between total mothers' knowledge and their total health-related practices regarding diabetic nephropathy in pre, posttest1 and 2**

Total practices	Level of mothers' knowledge in pretest		P-value 1	Level of mothers' knowledge in posttest1		P-value 2	Level of mothers' knowledge in posttest2		P-value 3
	Satisfactory (20)	Unsatisfactory (80)		Satisfactory (96)	Unsatisfactory (4)		Satisfactory (93)	Unsatisfactory (7)	
	No (%)	No (%)		No (%)	No (%)		No (%)	No (%)	
Done	4(20.0)	31(38.8)	<b>0.116</b>	82(85.4)	0(0.0)	<b>0.001**</b>	88(94.6)	3(42.9)	<b>0.001**</b>
Not done	16(80.0)	49(61.3)		14(14.6)	4(100.0)		5(5.4)	4(57.1)	

(\*\*) *Highly statistically significant difference p < 0.01*

**Table (1):** Reveals that there were highly statistically significant differences between mothers' knowledge regarding diabetic nephropathy and their age and educational level during the pretest (P-values= 0.009 and 0.001 respectively). While there weren't relation during posttest 1 and 2 (P-values= 0.729 and 0.728 respectively).

**Figure (1):** Presents that mothers had unsatisfactory knowledge regarding diabetic nephropathy among school-aged children in pretest, which became satisfactory in posttest 1 and 2. Statistically significant differences were found in mothers' knowledge during pretest and posttest 2 (P-values= 0.001 and 0.001 respectively).

**Figure (2):** Shows that 56% of mothers had no source of information regarding diabetic nephropathy. However, 26% and 8% of mothers' sources of knowledge were from health care workers, friends/relatives and TV/radio respectively.

**Table (2):** Clarifies that there was a relationship between mothers' knowledge and child gender and BMI during the pretest (P-values=0.018 and 0.044 respectively). While, there weren't statistically significant differences with child age, birth order and school level during pretest, posttest 1 and 2 (P-values=0.437, 0.733, 0.519, 0.574, 0.190, 0.568, 0.475, 0.771 and 0.695 respectively).

**Figure (3):** Presents that there were highly statistically significant differences between mothers' total health-related practices in pretest and posttest1 and between mothers' total health-related practices in pretest and posttest2 with P-values= (0.001, 0.001 respectively). Likewise, there were statistically significant differences between mothers' total health-related practices in posttest 1 and 2 with p-value (0.021).

**Table (3):** Illustrates that mothers who had university education did practices during pretest with P-values= 0.002. Also; mothers were read & write done practices during posttest1 (p-value 0.006). Similarly, the housewives mothers done practices in posttest1 (p-value= 0.002). Moreover, mothers who reside in rural areas did practices during pretest (p-value=0.002).

**Table (4):** Reveals that mothers who had children in primary education and with BMI= 16.9±2.89 done practices in pretest and post test1 with P-values=0.052 and 0.019 respectively. Also, mothers who had two children did practices in pretest and posttest1 with P-values= 0.035 and 0.037 respectively.

**Table (5):** Demonstrates that there was a relationship between total mothers' knowledge and their total health-related practices regarding diabetic nephropathy among school-aged children in posttest 1 and 2 P-values=0.001 and 0.001 respectively.

## Discussion

Diabetic nephropathy is a principal cause of morbidity and has an association with increased cardiovascular mortality in Type 1 and Type 2 Diabetes Mellitus (T2DM). There is definite evidence that risks of nephropathy and other diabetic complications are lowered by strict control of hyperglycemia. The number of children with chronic kidney disease is rising markedly and CKD is now being recognized as a major public health problem worldwide. Mothers play a critical role in providing home-based diabetes intervention to their children and delaying the onset of disease complications (Bansal et al, 2018 & Abdalla et al, 2020).

Therefore, pediatric and community health care professionals ought to understand the natural history, risk factors and methods for screening diabetic nephropathy. Identification of risk factors and subclinical signs of complications need to be achieved early during adolescence and in the case of type 1 diabetes at diagnosis and represent essential tools for the early implementation of preventive and therapeutic strategies (Giannini et al, 2012).

The current study aimed to evaluate effect of health educational program regarding nephropathy for mothers of children suffering from Diabetes Mellitus at Assiut City.

The present results disclosed the presence of an important relation connecting the mothers' knowledge with their age during the pretest. This observation was in the same line with Albuja et al,

(2018) who carried out a study in the Kingdom of Saudi Arabia about the level of awareness of chronic kidney diseases among diabetic patients and recorded that age had an impact on the respondents' knowledge. Otherwise, **Saraswathi et al, (2013)** conducted a study in Indira to assess the knowledge on nephrotic syndrome among mothers of children admitted with nephrotic syndrome and reported that age doesn't significantly affect mothers' knowledge. This result could be due to most of the studied mothers their ages between >29-39 years old and these middle ages were more aware and oriented than younger or older ones.

Also, there was a linked relation between mothers' educational level and their knowledge about diabetic nephropathy during pretest. This was agreed with, **Saraswathi et al, (2013) & Khider et al, (2017)** who assessed nephrotic syndrome knowledge and healthcare-related practices among school-age children and their mothers and **Ajarmeh et al, (2018)** who studied the Jordanian parents' knowledge and attitudes regarding kidney disease in children and recorded a significant relation between mothers' educational level and total knowledge. While the study results found that there wasn't a significant relation between mothers' knowledge and their occupation and residence. These findings were similar to **Saraswathi et al, (2013)** and incongruent with **Khider et al, (2017)** who recorded the effect of occupation and residence on studied sample knowledge. This might be due to the majority of the studied mothers being housewives and residing the rural areas.

Regarding the total knowledge of mothers about diabetic nephropathy; it was found that the majority of mothers had unsatisfactory knowledge during the pretest. This interpretation was congruent with **Saraswathi et al, (2013)** who reported that less than three-quarters of mothers had poor knowledge in the pretest. In this regard, **Ajarmeh et al, (2018)** recorded that parents had some knowledge of childhood kidney disease. This can be explained that most of the knowledge and studies regarding CKD are concerning adults, especially those at high risk for CKD (e.g., patients with hypertension and diabetes mellitus). While very little knowledge and studies about pediatric patients.

Likewise, a study carried out by **El-Shahat et al, (2018)** who studied the effect of an educational program on knowledge and practice of nurses who are caring for nephrotic children and found that more than half of the pediatric nurses had unsatisfactory knowledge to give health teaching about nephrotic syndrome in the pretest. On the other hand, **Diong et al, (2019)** assessed parental knowledge about nephrotic syndrome and disease relapse in children

and recorded that parents had a good level of knowledge.

Furthermore, it was remarked that there were statistically significant differences found in mothers' knowledge during pretest and posttest. These findings were continuous with the results of **Mohammed et al, (2017)** who evaluated the effect of implementation of teaching program about care of children with nephrotic syndrome on nurses' knowledge and practice and **El-Shahat, (2018)**. The finding was also supported by **Abdalla, (2020)** who assessed knowledge and practice of mothers having children with chronic kidney disease and reported that there was a highly statistically significant difference observed regarding total mothers' knowledge about chronic kidney disease pre/post-intervention of the empowerment program. This explained that the educational health program resulted in a successful rising in mothers' knowledge by increasing their proper practices.

The current study found that more than half of mothers had no source of information regarding diabetic nephropathy; however, one-quarter and nearly one-tenth of their sources of knowledge were from health care workers and friends/relatives respectively. These results were concurrent with **Saraswathi et al., (2013)** reported that less than one-tenth had knowledge from health personnel. These results disagreed with **Rahaman et al, (2017)** who carried out a study in Dhaka about knowledge, attitude and practices regarding chronic complications of diabetes among patients with type 2 diabetes and **Albujays et al., (2018)** who pointed out that near two-thirds of the studied sample their source of knowledge were health professionals. As well as **Diong et al, (2019)** found that the main source of information was healthcare workers. The explanation might be the physician's focus on disease management rather than preventive care or a heavy load of patients. Existing clinical evidence suggests that increasing community awareness regarding diabetes management is an ultimate tool for halting complications due to diabetes.

In referral to the relation between mother knowledge and child's personal data; the current results revealed that there was no relation between mothers' knowledge and child age. This result was in the same line with **Saraswathi et al., (2013)**. However, there was a relationship between mothers' knowledge and child gender during the pretest and this was in contrast to **Saraswathi et al., (2013)**.

As regards the studied mothers' total practices regarding diabetic nephropathy among school-aged children: The present results pointed out that there was a statistically significant difference in mothers' total practices between pre and posttest. This was

similar to **Hassan, (2014)** who developed a clinical protocol for nursing practice: improving the care of children with nephrotic syndrome, Faculty of Nursing Ain Shams University and **El-Shahat et al, (2018)** who revealed that there was an improvement in mothers' health-related practice after the program implementation.–This can be interpreted that mothers did not have full awareness and information about health-related practices which should be done to delay and prevent the occurrence of diabetic nephropathy for their children and this was changed completely after program implementation and knowing what they should be done exactly in health-related practices such as; measuring child's weight daily, examining child urine ..... etc.

The proposed results showed that there was a relationship between total mothers' knowledge and their total health-related practice regarding diabetic nephropathy among school-aged children in posttest 1 and 2. This finding was the same as those reported by **and Khider et al, (2017)** and **Abolwafa & Hossein, (2018)** who evaluated the effect of educational program on knowledge and health care practices about nephrotic syndrome among mothers of preschool children and found the existence of a highly statistically significant positive connection between studied mothers' knowledge about their children with NS and their stated health care interrelated acts. So that mothers who had unsatisfactory knowledge about NS had unsatisfactory reported healthcare-related practices and this might be a result of illiteracy. This was also in the same line with **Sarika, (2017)** who carried out a study in India to assess knowledge and practices of parents regarding home management of children with nephrotic syndrome and reported that there was a positive correlation between parents' knowledge and practices scores.

### Conclusion:

There were highly statistically significant differences between mothers' knowledge regarding diabetic nephropathy and their age and educational level during pretest. The implemented educational program had a positive effect on maternal knowledge and their subsequent health-related practices.

### Recommendations:

1. Developed training and educational program for mothers is necessary to improve the quality of practices provided to their children toward the prevention of diabetic nephropathy.
2. Simple Arabic illustrative booklets and brochures including the required knowledge and practices about nephropathy in diabetic children should be available for mothers at the pediatric outpatient clinics.

3. Further researches about prevention of diabetic complications especially diabetic nephropathy to provide health teaching to diabetic children and their parents.

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