

Effect of Educational Intervention on Pediatric Diabetes self Care Practices

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Abstract: Background: Diabetes mellitus is among the most common chronic illnesses in childhood, it is a chronic metabolic condition affecting the child's physical and physiological growth and development. Aim of the study: Study the effect of educational intervention on pediatric diabetes self care practices. Research design: A quasi experimental design (one group pre/post test) was used in the study. Settings: The present study was carried out at pediatric outpatient unit affiliated to Suez Canal University Hospitals and Health Insurance Hospital at Ismailia city. Sample: A non probability purposive sample (30) of diabetic children at the previously mentioned settings. Tools for data collection: The data were collected using two tools namely structured interview questionnaire and observational checklists to assess diabetes self care practices. Results: There was statistically significant difference in the total mean scores of satisfactory knowledge and self care practice pre/immediate post educational intervention. The total satisfactory knowledge was 100% immediate post educational intervention compared with 6.7% pre intervention. The total satisfactory level of self care practice was 100% immediate post educational intervention compared with 63.3% pre educational intervention. Conclusion: The educational intervention had a positive effect on children's diabetes self care practices. Recommendations: Periodic educational interventions are required to achieve positive change on diabetic children's self care practices.

Keywords: Diabetic children, educational intervention, Knowledge, Nursing, Practice.

1. INTRODUCTION

Diabetes mellitus is among the most common chronic illnesses in childhood. The world health organization (WHO), define diabetes mellitus as a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. Diabetes mellitus can lead to damage, dysfunction, or failure of various organs specially eyes, kidneys, nerves, heart and blood vessels (Hussein et al., 2018).

The diabetic children must follow certain self care practices to achieve optimal glycemic control and prevent complications. Self care in diabetes has been defined as a set of behaviors practiced by people with or at risk of diabetes for successful management of the disease on their own. These behaviors are well established; they involve regular physical activity, appropriate dietary regimen, daily foot care and compliance with treatment (Attia and Hassan, 2017).

Children and adolescents with diabetes need to learn to self manage their disease early and gradually after diagnosis and this should be integrated in their personal routines. There might be some differences in self care between pediatric and adult

patients related to cognitive ability of children and emotional maturity in adolescents. However, research demonstrated children who practice self monitoring of blood glucose showed good tolerance of the testing process. This would also help a smooth transition from pediatric to adult care for diabetes (Campbell et al., 2016).

Inadequate diabetic self care remains a significant problem facing health care providers and population in all settings. Inadequate self care has an impact on the children's morbidity and mortality as well as on increasing the costs of medication, laboratory tests also cost in time and effort of the care providers. In contrast, children who have adequate self care have better outcomes, live longer, enjoy a better quality of life and suffer fewer symptoms and minimal complications related to diabetes. The pediatric nurse helps the diabetic children to accept the disease and provide education regarding blood glucose monitoring, insulin injection, urine analysis, diet, exercise and hygiene (Marques et al., 2014).

Significance of the Study

Diabetes is one of the most common challenges to health in the new Century and is known to be one of the most prevalent chronic childhood illnesses. The incidence of this disease is continually rising all over the world and it might be associated with the feeling of stigma, which complicates its management. Prevalence of DM in Egypt is among the highest in the Middle East and North Africa countries with 7.8 million people known to have diabetes mellitus. A global survey found that, only 16.2% of diabetic children adhere to recommendations regarding self care practices. Thus, there is a need for sustained active child education, support and evaluation to increase children involvement in the self care practices (Elewa and Saad, 2017). Therefore, the current study will be carried out to study the effect of educational intervention on pediatric diabetes self care practices.

The aim of the study

Study the effect of educational intervention on pediatric diabetes self care practices.

Objectives of the study

1. Assess children's knowledge about diabetes mellitus.
2. Assess children's self care practices about diabetes mellitus.
3. Evaluate the effect of educational intervention on self care practices of diabetic children.

Research hypothesis

Educational intervention will have a positive effect on children's diabetes self care practices.

2. SUBJECTS AND METHODS

Study design

Quasi experimental design (one group pre/post test) was used in the study.

Study setting

The present study was carried out at Pediatric outpatient unit affiliated to Suez Canal University Hospitals and Health Insurance Hospital affiliated to Ministry of Health at Ismailia city. Pediatric outpatient unit at Suez Canal University Hospitals lies in the 1st floor that composed of three rooms where one of it is specialized for diabetic children (every Saturday and Tuesday/week).

Study subjects

A non probability purposive sample of 30 of diabetic children were recruited in the study according to the following inclusion criteria: children aged 6–12 years old diagnosed with diabetes mellitus and their mothers. The exclusion criteria: children were having another endocrinal disorder or attended a previous similar training.

Tool of data collection

Tool I: A structured interview questionnaire: This tool was designed by the researcher in simple Arabic language to suit the understanding level of the studied diabetic children after reviewing recent and relevant literature to assess children's knowledge regarding diabetes mellitus and diabetes self care practices. It was divided into three parts:

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Part 1: Concerned with characteristics of the studied children and their parents.

Part 2: Children's knowledge regarding diabetes mellitus.

Part 3: Children's knowledge regarding diabetes self care practices and divided into:

- 1- Insulin (types, indications, preparation and injection, storage, frequency and sites of injection).
- 2- Diet (healthy diet, food pyramid, amount of food and hypoglycemia).
- 3- Exercise (types, precautions and hypoglycemia).
- 4- Hygiene (eye care, teeth care, foot care, bathing and wound care).
- 5- Checkup (importance and schedule).

Scoring System

The total number of questions that assessed the studied children's knowledge was (29). The correct answer was given one score and incorrect answer or don't know were given zero. The scores were summed up and converted into percent score. According to **Attia and Hassan, (2017)** knowledge was considered to be satisfactory if the studied children's knowledge total scores percent was $\geq 60\%$ or unsatisfactory if the studied children's total scores of knowledge percent was $< 60\%$.

Tool II: Observational checklists: These checklists were adapted from **Greenberg, (2016)** and **Hockenberry and Wilson, (2014)**. The checklists used by the researcher to assess children's self care practice regarding: self insulin preparation and injection by syringe (24 items), insulin self preparation and injection by pen (12 items), self blood glucose monitoring using glucometer (19 items), self urine monitoring for glucose (10 items) and hygienic care (17 items).

Scoring System

The possible choice for each item was done and not done. Each child was given one score for step done correctly and zero for that was not done or done incorrectly. According to **Attia and Hassan, (2017)** the total score of children's self care practices were classified into satisfactory if score was 60% and more, while a score below 60% was considered unsatisfactory.

Validity of the study tools

The study tools were tested for its face and content validity and applicability. Also, determine whether the included items were comprehensive, understandable, applicable, and suitable to achieve the aim of the study by 5 expertises from the Pediatric and Medical Surgical Departments at Faculty of Nursing Suez Canal University and Pediatric Department at Faculty of Medicine in Suez Canal University.

Reliability of the study tools

It was done using Cronbach's alpha coefficient test to assess the internal consistency of the tools and its value was (**0.72**) for knowledge items (structured interview questionnaire), (**0.89**) for self care practices items (observational checklists).

Pilot study

A pilot study was carried out after the development of the study tools before starting the data collection, including 10% of the sample size (3 children). It was carried out to check the validity, clarity and applicability of the study tools. Based on the results of the pilot study, the necessary modification was done namely, ambiguous items were omitted, other items were added and others were modified and the final form was developed according to the subject's responses. The pilot study subjects were excluded from the study sample.

Field work

The study was carried out over seven months during the period from the first of February 2019 to the end of August 2019. Data collection was conducted through four phases (assessment, planning, implementation and evaluation phases).

A. Assessment phase:-

Pre test tools were given to the studied children through the interview and the researcher was ready to reply to any explanations from the studied children. During pre test phase, the researcher gave rest periods when observed that children had difficulty in concentration for a period of time. The researcher used tool I and II for pre test.

B. Planning phase:

Based on the actual need assessment of the studied children, the researcher designed the educational intervention through reviewing relevant literature and based on recent evidence based guidelines for diabetes mellitus. The educational intervention was developed by the researcher; detected needs, requirements, deficiencies were translated to aim and objectives. Moreover, teaching materials were prepared (e.g. real object, PowerPoint presentation, booklet that helped in covering theoretical and practical information. The educational intervention was covered the theoretical and practical skills related diabetes mellitus. Booklet was designed by the researcher and it was written in simple Arabic language and supplemented by photos and illustrations to help studied children understand the content.

C. Implementation phase:

The educational intervention was implemented in the form of session motivation and reinforcement for enhancing sharing in the study. The total numbers of sessions were four sessions divided into two theoretical sessions and two practical sessions. The teaching session started from 9 am to 12 pm for 2 days/week (modified according to the children and their mothers' readiness and time). The educational intervention totally took 132h/ 22 weeks.

Ethical considerations

Oral approval, were obtained from the studied children and their mothers prior to participation in the study after simple explanation of the aim and expected outcomes of the study. Also, each child was familiar with the importance of his/her participation and they had the right to withdraw from the study at any time. Ensuring the confidentiality of the information collected and anonymity was guaranteed.

Data analysis

The collected data was coded, organized, tabulated and analyzed using Statistical Package for the Social Sciences (SPSS version 20). The suitable statistical tests were used according to the type of data. Chi Square test (X^2) was used for categorical data. Correlations were used to test relationships between different variables. P value was set at <0.05 for significant results.

The following statistical techniques were used:

- Percentage
- Mean score degree (\bar{X})
- Standard deviation (SD)
- Paired t test
- Proportion probability of error (P - value)

3. RESULTS

Table (1): shows that most (73.3 %) of the studied children's age were from $10 \leq 12$ years. Also, 56.7% of the studied children were males. More than half (56.7%) of the studied children had the first ranking. 50% of the studied children had duration of illness from 1 to less than 3years.

Table (2): reveals that, more than one third (36.7%, 36.7%) of the studied children's parents were secondary level education. More than half (50%, 56.7%) of parents were employed.

Table (3): shows that there was statistically significant difference in the total mean scores of satisfactory knowledge pre/immediate post educational intervention regarding knowledge regarding DM, insulin, diet, exercise, hygiene and checkup (p -value<0.05)

Figure (1): shows that, the total satisfactory knowledge was 100% immediate post educational intervention compared with 6.7% pre intervention.

Table (4) shows that there was statistically significant difference in the total mean scores of satisfactory self care practice pre/immediate post educational intervention regarding hygienic care, blood glucose monitoring, insulin self preparation and injection, self urine monitoring for glucose.

Figure (2) shows that, the total satisfactory level of self care practice was 100% immediate post educational intervention compared with 63.3% pre educational intervention.

4. DISCUSSION

Diabetes is a serious threat to global health; it is among the top 10 causes of death. Children living with diabetes are at risk of developing a number of serious and life threatening complications, leading to an increased need for medical care, a reduced quality of life and undue stress on families. Diabetes and its complications, if not well managed, can lead to frequent hospital admissions and premature death. Also, there is a positive message with early diagnosis and access to appropriate care, diabetes can be managed and its complications prevented (**IDF, 2019**).

The diabetic children must follow certain self care practices to achieve optimal glycemic control and prevent complications. Diabetes self care has been defined as a set of behaviors practiced by children with or at risk of diabetes for successful management of the disease on their own. These behaviors involve regular physical activity, appropriate dietary regimen, daily foot care and compliance with treatment (**Marques et al., 2014**).

The results of the present study **table (1)**, illustrated that the highest percentage of the studied children were in the age group from 10 to 12 years old, these study results were in an accordance with a study done by **Franklin et al. (2014)**, whom carried out a study about "Real Time Support of Pediatric Diabetes Self care by a Transport Team", which illuminated that diabetic children's means age was 11.1 years. Also, these study results were emphasized by **Awad et al. (2019)**, whom carried out a study about "Effect of an Intervention Program on Improving Knowledge and Self-Care Practices for Diabetic School-age Children" which illuminated that the age median of the studied children was 10.5.

Regarding gender, the study results clarified that more than half of the studied children were males. The study results were in agreement with a study held by **Awad et al. (2019)**, found that the study sample was slightly more males . while, The results were in disagreement with a study held by **Ali et al. (2014)**, a study entitled "Evaluation Self Care Practices of Children with Type 1 Diabetes Mellitus in Northern West Bank: A Controlled Randomized Study Utilizing Orem Self Care Theory" found that nearly half of the studied were females.

Regarding ranking, the study results clarified that more than half of the studied children had the first ranking. The results were in disagreement with a study held by **Awad et al. (2019)**, who found that most of the studied children were second born and more.

Regarding duration of illness, the study results clarified that half of the studied children had duration of illness from one to less than three years. These results were in some degree of agreement with **Kafil and El Sayed, (2020)** a study entitled "Self care Management of Children with Type 1 Diabetes Mellitus: Effect of an Educational Training Program" who found that more than half of the studied children had duration of illness from one to less than five years old. These results could be explained in the light of the study done by **El-Ziny et al. (2014)**, entitled "Epidemiology of Childhood Type 1 Diabetes Mellitus in Nile Delta, Northern Egypt - A Retrospective Study" whom confirmed that, the studied children had short duration of illness (one to less than three years).

Concerning parents' education **table (2)**, the present study findings illustrated that, more than one third of the studied children's parents were secondary level education. these results were consistent with a study done by **Attia and Hassan, (2017)** who carried out a study about "Effect of Instructions on Selected Self care Practices among Type 1 Diabetic Children" which revealed that more than two thirds of the studied children fathers and mothers were educated. Furthermore, these results agreed with **Awad et al. (2019)**, who revealed that more than half of the studied children fathers and mothers were intermediate education. These results could be interpreted in the light of fact that most of the study sample parents were from urban area where they had been educated.

Concerning parents' work the study results noted that more than half of parents were employed, these results were in correspondence with a study held by **Ali et al. (2014)**, revealed that more than half of the studied children fathers were employed.

As regards total mean scores of the studied children satisfactory knowledge pre/immediate post educational intervention **table (3)** study results noted that there were statistical significance differences between pre/immediate post of the educational intervention regarding total mean score of knowledge. These results were in correspondence with **Kafil and El Sayed, (2020)** whom revealed that there was a significant improvement in the studied children total level of knowledge scores post implementation of the educational training program.

Also, these results were in an agreement with a study held by **Ali et al. (2014)**, found that there were statistically significant difference between pre and post test for the intervention group regarding total level of knowledge, the difference was toward the post test. Moreover, these results were in the same context.

Furthermore, these results were in an agreement with **Sachmechi et al. (2015)**, who carried out a study entitled "Impact of Diabetes Education Peer Support Group on the Metabolic Parameters of Patients with Diabetes Mellitus (Type₁ and Type₂)" whom found that, there is significant improvement in participants' total level of knowledge post implementation of the educational program. Also, this study results were in agreement with **Leena and D'Souza, (2014)** who mentioned that there was a significant improvement in the mean knowledge scores of children of two different groups (routine and child to child groups) pre and post education.

The post test results could be interpreted in the light of the fact that the studied children' knowledge increased immediately due to increasing memory retention after educational intervention. As well as the educational intervention that the researcher applied in form of printed materials (booklets, handouts).

Concerning satisfactory knowledge of the studied children pre/immediate post educational intervention **figure (1)**, the current study revealed that the total satisfactory knowledge was 100% immediate post educational intervention compared with 6.7% pre intervention. The study results were in an agreement with a study done by **Mourao et al. (2021)**, whom carried out a study about "Effectiveness of Diabetes Educational Intervention at Primary School" which revealed that with regard to general knowledge about diabetes after the interventions, there was a greater number of correct answers in all questions related to knowledge.

Also, these results were consistent with study held by **Abolwafa et al. (2017)**, entitled "Effect of Educational Program on Improving Knowledge and Practice for Adolescents with Type₁ Diabetes" who revealed that the majority of the studied children knew sufficient knowledge about their disease in immediate post test.

Also, these results were concur with **Attia and Hassan, (2017)** revealed that most of the studied children had good knowledge after instructions application. This may be related to the fact that children themselves can easily detect these manifestations, as they be able to feel the fluctuations of their blood glucose level occurs especially after they have known the causes and manifestations from the educational intervention.

Regarding total mean scores of the studied children satisfactory self care practice pre/immediate post educational intervention **table (4)**, there was statistically significant difference in the total mean scores of satisfactory self care practice pre/immediate post educational intervention regarding hygienic care, blood glucose monitoring, insulin self preparation and injection, self urine monitoring for glucose. This study results were emphasized by **Ali et al. (2014)**, who illuminated that there were statistically significant differences between total mean scores of self care practice pre/immediate post test, the difference was toward the post test.

These results were in identical line with a study done by **Elewa and Saad, (2017)** which illuminated that total mean score for the studied children practice before education application was fifteen percent and after application was thirty percent. So, there was a highly significance difference between pre and post intervention regarding practice.

Also, these findings could be explained due to that majority of the children expressed their satisfaction with the educational intervention provided to them and with the associated gains in information and practical skills. This high satisfaction could be attributed to the fact that their curiosity to know and practice was met in this program. Thus, they had fun while learning and gaining more control of their own health. In this respect **Pelicand et al. (2015)**, entitled "Self care Support in Pediatric

Patients with Type 1 Diabetes: Bridging the Gap between Patient Education and Health Promotion" emphasized the importance of satisfying children's need to gain autonomy in the management of their condition. So, their self care practice post intervention was better than pre intervention.

On the other hand, regarding total satisfactory level of self care practice of the studied children pre/immediate post educational intervention **figure (2)** the results revealed that the total satisfactory level of self care practice was one hundred percent immediate post educational intervention compared with sixty three percent pre educational intervention. This study results were emphasized by **Abolwafa et al. (2017)**, illuminated that there was a great improvement in the studied children total satisfactory practice post intervention than pre intervention.

These findings could be explained due to the majority of the studied children depend on their parents on performing their self care practices before intervention program, after learning the diabetic skills and demonstrate it more than one time they became able to perform the practices by themselves. Finally, diabetic children are capable of taking responsibility for self management of their chronic diseases, with some support from their families, when they receive proper instructions and when health resources are available (**Beacham and Deatrick, 2013**).

5. CONCLUSION

The educational intervention had a positive effect on children's diabetes self care practices.

6. RECOMMENDATIONS

1. Start educational intervention regarding self care practices of diabetic children immediately upon diagnosis to avoid short and long term diabetes related complications.
2. Periodic educational interventions are required to achieve positive change in diabetic children's self care practices.
3. Replicate the current study involving larger sample size for better generalization of the study findings.

Table (1): Percentage distribution of the studied children according to their characteristics (n = 30)

Children's characteristics	No.	%
Age in years		
6: < 8	3	10.0
8: < 10	5	16.7
10: ≤ 12	22	73.3
Gender		
Male	17	56.7
Female	13	43.3
Ranking		
First	17	56.7
Second and more	13	43.3
Duration of the illness / (years)		
< 1 year	9	30.0
1:<3	15	50.0
3:<6	2	6.7
≥6	4	13.3

Table (2): Percentage distribution of the studied children’s parents according to their characteristics (n = 30)

Parents' characteristics	Father (%)	Mother (%)
Educational level		
Illiterate	10.0	13.3
Primary	3.3	3.3
Preparatory	13.4	23.3
Secondary	36.7	36.7
University	36.5	23.4
Working as		
Employee	50.0	56.7
Free business	50.0	43.3

Table (3): Total mean scores of the studied children satisfactory knowledge pre/immediate post educational intervention (n= 30)

Total satisfactory knowledge mean score	Pre		Post		t-test	P- value
	\bar{X}	$\pm SD$	\bar{X}	$\pm SD$		
Knowledge regarding DM	5.57	± 1.65	8.97	± 0.76	9.87	<.001*
Insulin	2.37	± 0.99	4.90	± 0.66	11.60	<.001*
Diet	.70	± 0.65	2.73	± 0.64	12.003	<.001*
Exercise	.80	± 0.89	2.97	± 0.18	13.57	<.001*
Hygiene	2.70	± 1.06	4.63	± 0.76	10.44	<.001*
Checkup	.77	± 0.63	1.83	± 0.37	8.45	<.001*
Total knowledge	12.90	± 2.39	26.03	± 2.04	25.69	<.001*

Figure (1): Percentage distribution of the studied children's total satisfactory knowledge pre/immediate post educational intervention (n=30)

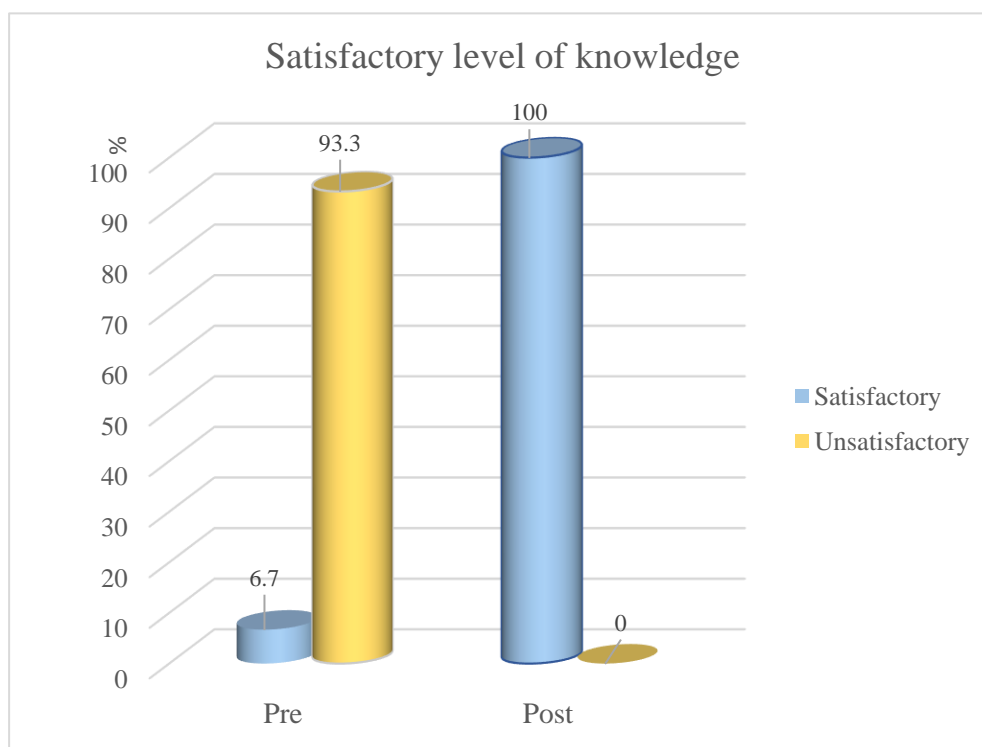


Table (4): Total mean scores of the studied children satisfactory self care practice pre/immediate post educational intervention (n= 30)

Total mean scores of satisfactory self care practice	Pre	Post	t-test	P- value
	$\bar{X} \pm SD$	$\bar{X} \pm SD$		
Hygienic care	4.96± 4.31	16.60± 1.37	15.15	<.001*
Blood glucose monitoring	8.73± 3.21	16.16± 1.11	12.42	<.001*
Insulin self preparation and injection	1.93± 1.72	9.43± 1.16	19.90	<.001*
Self urine monitoring for glucose	2.40± 1.63	7.76± 1.38	14.76	<.001*
Total Practices	18.03± 9.41	49.96± 2.95	18.12	<.001*

t-test is paired sample t test; p-value is significant <.05.

Figure (2): Percentage distribution of the studied children's total satisfactory self care practice pre/immediate post educational intervention (n= 30)



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