

# Evaluation of Training of Children in Controlling Diabetes in Omdurman Pediatric Hospital in Khartoum State, 2011-2013

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**Abstract:** This an interventional study, pre and post study conducted in Khartoum State, from August 2011–2013, to assess the effect of the training of diabetic children in improving the control and management of diabetes. Convenience sampling technique was used to select 101 diabetic children from Khartoum State. The sample size was according to the attendance to Omdurman pediatric hospital Diabetic clinic during data collection period. The data was collected by using a pre-tested questionnaire by the researcher. The data was then analyzed by using Statistical Package for Social Sciences (SPSS) version 20. The results of the study showed that; the training program for diabetic children and their carers has increased the level of their knowledge about management of diabetes from 21.5% to 65.1%. It is also effective in enhancing a wide range of diabetic children and their carers' knowledge about insulin from 28.40% to 82.32%. Innovative training programme for diabetic children and their carers is significantly effective in increasing their knowledge about checkup of diabetes from 8.2% to 90.80%. The study revealed that; the implementation of diabetes education for children with type1 diabetes has improved glycemic control. The study recommended that training programs about diabetic care for children and their carers should be emphasized at all pediatrics hospitals, Long term interventions are required for getting accurate diabetes control and more reduction of HbA1c and Further researches with different design, different location to be conducted to assess the effectiveness of interventions on sustained glycemic control.

**Keywords:** Disability, Diabetes, Complications, Glycaemia Control, Training

## 1. Introduction

Diabetes Mellitus in children is a chronic medical problem, with many complications affecting the Growth and Development in early and late childhood. Children are now developing type 1 diabetes at an earlier age. The overall incidence of type 1 diabetes in 2010 is predicted to be approximately 40% higher than the incidence recorded in 1997. The incidence of type 2 diabetes has also increased in children; before 1990, only 5% of diabetic youth were classified as having type 2 diabetes, but today, up to half of all diagnosed cases of diabetes in youth are classified as type 2 diabetes.

[1]. Evidence has been accumulating that demonstrates a worldwide increase in the incidence of type 1 diabetes mellitus, with incidence rising especially in areas where type 1 diabetes was previously low [2]. The prevalence of diabetes mellitus in Sudan was dramatically increased from 3.4% in 1996 to 8.05% in 2012 according to (IDF international diabetic Middle East and North Africa (MENA)). With the increasing of diabetes prevalence, the diabetes related-complications will also increase. The aspects of diabetes care in Sudan; health education is the most deficient among children [3]. The problems of diabetes care in Sudan include the lack of efficient diabetes care centres, lack of specially

trained personnel, the high cost of anti-diabetic treatments, poor compliance with therapy or diet, ignorance and wrong beliefs, food and dietary factors and gender-related problems. In children, the problem is overwhelming and it needs more attention and interventions [4]. There is an almost total deficiency of both diabetes nurse educators and educational material in care settings; however, no traced studies in Sudan examined the effectiveness of education intervention given to the children or their carers, comparing to the prevalence of the disease in Sudan. Therefore, this study will examine the effect of education intervention on controlling diabetes. The study results will provide knowledge and guidelines for improving the children diabetes control. On study done assessing maths literacy skills in type 1 diabetic children and their caregivers that; educational programmes need to be developed to accommodate patients and caregivers with inadequate numeracy skills. Such programmes need to incorporate numeracy training as a core component of diabetes education, and need to be tailored to each person's individual needs, [5]. Education of patients with diabetes is considered a fundamental aspect of diabetes care and aims to empower patients by improving knowledge skills and to improve the knowledge of the research team [6]. Effects of diabetes education on glycaemic control: When evaluating glycaemic control in clinical practice the laboratory marker glycated haemoglobin (HbA1c) is the golden standard, [10]. HbA1c describes the blood glucose level during the last 2-3 months and is the general measure when goals of glycaemic control in guidelines are set. It is also the marker used when evaluating new pharmacological treatments and when assessing the importance of glycaemic control in the development of diabetic complications. Despite the presence of an educational program in the hospital, but it is not *regular* and the standard mean to assess the effectiveness are lacking [6].

## 2. Materials and Methods

This study was conducted in Omdurman Paediatric Hospital from July 2011 to July 2013 as an interventional study, pre and post intervention design was implemented, and evaluated diabetic children training programme for controlling the blood sugar. The researcher first, assessed the situation in the study area; followed by modification and preparation of the training programme, then, raising knowledge and skills of diabetic children and their carers for controlling blood sugar. Finally, evaluation of the impact of the training on diabetic children knowledge and behaviour and HbA1c levels and occurrence of diabetes complications was conducted. The sampling procedure was convenience total coverage for any diabetic child attended to Omdurman Paediatric Hospital during data collection period from February 2013 to August 2013. The total attended children were 101, the data collected from 67 mothers of diabetic children and 34 from the children themselves using Questionnaire for knowledge. The research team excluded the children who previously attended and enrolled in the

study in the previous visit. Data was collected by the researcher and the assistance trained team by asking questions to assess level of knowledge and observation for practices and the training on self-care diabetes management were provided. The data was then entered into computer and analyzed using both Microsoft excel and Statistical Package for Social Sciences (SPSS) version 20. The results then presented into tables and figures.

### 2.1. Data Management

Knowledge measurement scale is Likert scale in pre-test and post-test, which set as (0) for who had false answer or do not know and (1) for who had correct answer. The behaviour measurement scale is likert scale in pre-test and post-test, which ranged from 0 to 4. Frequency of diabetes complication was calculated at pre-test and post-test. The researcher asked the children and their carers on the occurrence of early or late complications observed for the symptoms, and recorded investigations.

### 2.2. Data Analysis

The data was analysed by using Statistical Package for Social Sciences (SPSS) version 20 for quantitative data to find out Hb A1c- mothers' knowledge and practice. Total score of knowledge and behaviour were also calculated, from scores of each questions provided, and compared at pre-test and post-test. The significant differences at 95% confidence interval level was used due which were measured by paired sample t test, which usually used to measure the difference in one group at different times such as pre and post intervention scores.

Gender of diabetic children in Omdurman Paediatric Hospital, n= 101

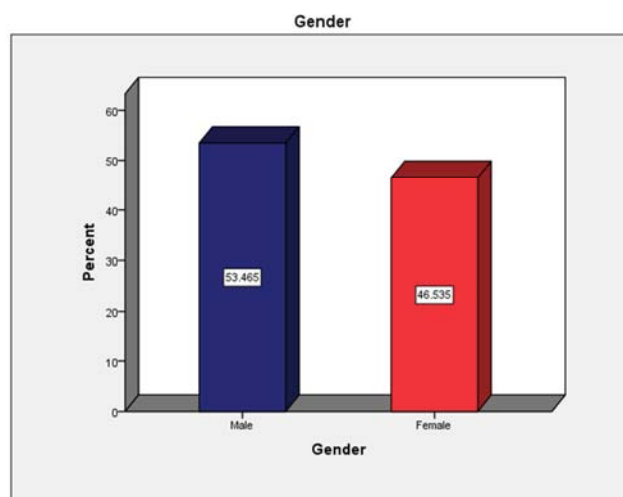


Figure 1. Gender of diabetic children in Omdurman Paediatric Hospital, n=101.

## 3. The Results and Discussion

Descriptive analysis was conducted to find out the percentages and frequencies of diabetic patients' gender, age and education participated in the study. The gender of

children under study was semi equal; 53% male and 47% female figure (1). All children were included in this item, even for those who were assessed through their carers. This included males and females as they were semi equal in numbers, figure (1), in spite of most of them their ages 10 < 14 years old, figure (2). The study revealed that; The significant differences of detailed knowledge of diabetic children about management of diabetes before and after intervention are reflected in the table (1) that the participants who participated in the study have highly significant scores of knowledge about diabetes hypoglycaemia and hyperglycaemia management at post-test than the scores at pre-test. The respondents who know how to manage hypoglycaemia immediately by giving juices or sugar are only about 23.8% before and 89.1% after intervention. Those who know how to manage hyperglycaemia insulin are about 21.8% before and 48.5% after intervention. This table reflects the significant differences of detailed knowledge about insulin before and after intervention, because their educational level did not effects by their diabetic causes as most of them still in schools, figure (3). The age of subjects under study were distributed among three groups. Most of them (66.34%) are between 10-14 years figure (2). Descriptive analysis also was conducted to find out the

percentages and frequencies of diabetic patients' education.

The education of children (six years or more) under study was satisfactory since 86.2% of them were educated, figure (3). This study used health belief model which is not similar to the study of long-term effects of a structured intensive diabetes education program me (SIDEPE) in patients with Type 1 diabetes mellitus 4-year follow-up study, it was found that; the patients in the SIDEPE group had significantly higher scores at post-test compared to pre-test. [9]. the effects of diabetic children intervention programme have a significant role in the reduction of diabetes complications occurrence. The study showed that there is no relationship between the HbA1c and the diabetes complication. Several epidemiologic studies on relations between higher HbA1c levels and diabetes complications which reflected the poor diabetes control [11]. Another study on effects of a structured educational intervention on metabolic control of type-1 diabetes mellitus patients was found that; the mean HbA1c level in the 21 children and adolescents at initial, 3rd and 6th month were 10.05% (SD 2.67%), 10.28% SD 2.23%) and 10.01% (SD 2.67%), which showed no significant changes ( $P>0.05$ ). After 6 educational sessions, the result showed significant changes in both parents' ( $P<0.05$ ). [8].

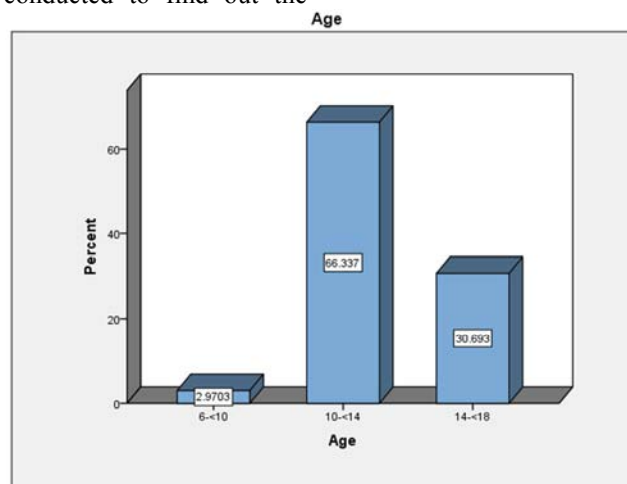


Figure 2. Age of diabetic children in Omdurman Paediatric Hospital, n= 101.

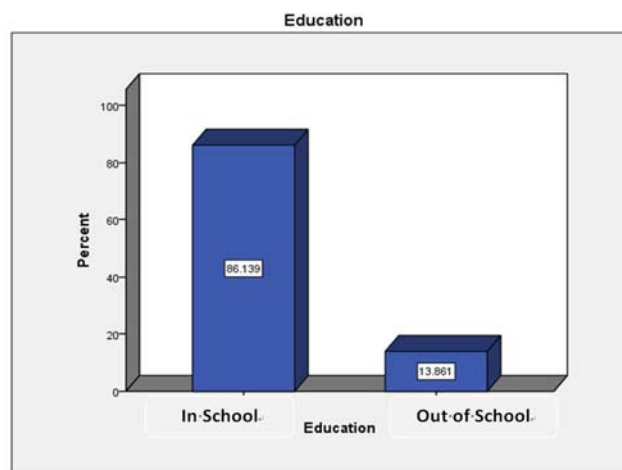


Figure 3. Education of diabetic children (six years or more) in Omdurman Paediatric Hospital, n=67.

Table (2) show that the respondents who answered correctly were scored 1 and total knowledge was calculated so the results show that; participants who participated in the study have highly significant scores of knowledge at post-test than the scores at pre-test. That means the intervention increases the level of knowledge about insulin significantly from 28.40% at pre-test to 82.32% at post-test. The study show that; participants who participated in the study have highly significant scores of knowledge about check-up at post-test (90.80%) than the scores at pre-test, [2, 8], table (3).

This study reflects significant reduction of HbA1c after intervention which conform with results from a Long-term effects of a structured intensive diabetes education programme (SIDEPE) in patients with Type 1 diabetes mellitus—a 4-year follow-up study, it was found that; The mean HbA1c of the SIDEPE group was significantly lower

than that of the control group at 6 months, and at 3 and 4 years ( $P < 0.005$ ). In particular, the mean HbA1c dropped dramatically after 6 months in the SIDEPE group. At 4 years, the HbA1c was 1.5 and 0.5% lower than at baseline in the SIDEPE and control groups, respectively (SIDEPE vs. control,  $7.9 \pm 1.2$  vs.  $8.7 \pm 1.6$ , respectively;  $P < 0.005$ ). [9]. Similar results were reported from study conducted on the role of medical students in patient education to promote home management of diabetes mellitus in Wad Medani town, Sudan. It showed that; there was a highly significant improvement in the knowledge, attitudes and practices of the diabetics, as a result of the student intervention. These included compliance to treatment, adherence to diabetic diet, regular care of the feet, knowledge of major diabetic complications, knowledge of signs of hypo glycaemia, and home management of hypoglycemia [7]

**Table 1.** Difference in knowledge of target group about management of diabetes complications at pre and post intervention in Omdurman Paediatric Hospital, n=101.

No.	Item	Correct answer Before intervention		Correct answer After intervention		p-value
		Freq.	%	Freq.	%	
1	How to manage hypoglycemia	26	25.7	23	22.8	0.00
2	Respondents know how to manage hyperglycemia	24	23.8	90	89.1	
3	How to manage hyperglycemia	22	21.8	49	48.5	
4	Respondents know how to manage hypoglycemia	25	24.7	88	87.1	
Total knowledge about management of diabetes		21.5%		65.1%		

**Table 2.** Difference in knowledge of diabetic children about insulin at pre and post intervention in Omdurman Paediatric Hospital, n=101.

No.	Item	Correct answer Before intervention		Correct answer After intervention		p-value
		Freq.	%	Freq.	%	
1	Respondents know the types of insulin	15	14.9	100	99.0	0.00
2	Respondents know what the action of insulin	16	15.8	101	100.0	
3	The action of insulin	101	100.0	101	100.0	
4	Respondents know how to store insulin	15	14.9	87	86.1	
5	How to store insulin	13	12.9	20	19.8	
6	Respondents know how to prepare insulin	12	11.9	100	99.0	
7	Respondents know how to calculate dose of insulin	26	25.7	101	100.0	
8	Respondents know site ofinsulin injections	14	13.9	101	100.0	
9	The sites of injection of insulin	62	61.4	87	86.1	
10	Respondents know how to administer insulin	17	16.8	101	100.0	
11	How to administer insulin	79	78.2	81	80.2	
12	Respondents know what the complications of insulin	7	6.9	101	100.0	
13	The complications of insulin	8	7.9	48	47.5	
Total knowledge about insulin		28.40%		82.32%		

Table (2), reflects the significant differences of detailed knowledge about insulin before and after intervention. The respondents who answered correctly were scored 1 and total knowledge was calculated. The results show that; participants who participated in the study have highly significant scores of knowledge at post-test than the scores at pre-test. That means the intervention increases the level of knowledge about insulin significantly.

**Table 3.** Difference in knowledge of diabetic children about checkup for diabetes at pre and post intervention in Omdurman Paediatric Hospital, n=101.

No.	Item	Correct answer Before intervention		Correct answer After intervention		p-value
		Freq.	%	Freq.	%	
1	Respondents know to describe plan for follow up	13	12.9	101	100.0	0.01
2	Plan for follow up	5	5.0	86	85.1	
3	Respondents know how to use the gluco meter	10	9.9	94	93.1	
4	Respondents know how to use the urine strip for sugar and acetone	5	5.0	86	85.1	
Total knowledge about check up for diabetes		8.2%		90.80%		

Table (3), reflects the differences of detailed knowledge about diabetes check-up before and after intervention. The results show that; participants who participated in the study have highly significant scores of knowledge about check-up at post-test than the scores at pre-test.

## 4. Conclusion

The study concluded that: The participants' knowledge about diabetic children care has increased after training programme for diabetic children. The training programme is effective in enhancing a wide range of diabetic children and their carers' skills about insulin.

## Recommendations

Training programmes about diabetic care for children and their carers should be emphasized for at all paediatric hospitals. The long term interventions are required for getting accurate diabetes control and more reduction of H<sub>A1c</sub>.

Further researches with different design, different location to be conducted to assess the effectiveness of interventions on sustained glycemic control in Khartoum state.

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## References

- [1] Ievers M. R. M. (2006) Pediatrics and child health, second edition
- [2] James.S. R. (2007) Nursing care of children: Principles of practice, third edition.
- [3] International Diabetes Federation, diabetes at glance, (2012) Middle East and North Africa region (MENA).
- [4] Zhang J. T. W John Wiley & Sons, (2011) Practical Diabetes International.
- [5] Moosa F. Y., (2011), Assessing maths literacy skills in type 1 diabetic children and their caregivers, University of the Witwatersrand.
- [6] BaradaranHR, Shams-Hosseini N, Noori-Hekmat S(2009), Effectiveness of Diabetes Educational Interventions in Iran: A Systematic Review, Department of Epidemiology, Iran University of Medical Sciences, Hemmat Highway, Tehran, Iran.
- [7] Ahmed ME., Abdelrahman SH., (2006), The role of medical students in patient education to promote home management of diabetes mellitus in Wad Medani town, Sudan. Journal of Family & Community Medicine.
- [8] Bernie E, Jose RL, and Boediman I. (2006) Effects of a structured educational intervention on metabolic control of type-1 diabetes mellitus patients, PediatricsIndonesian.
- [9] Ahn Y. B., (2006), Long-term effects of a structured intensive diabetes education programme (SIDEPE) in patients with Type 2 diabetes mellitus: a 4-year follow-up study. Diabetic MedicineJournal, Seoul, South Korea.
- [10] Jeffcoat SL (2004). Diabetes control and complications: the role of glycated haemoglobin, 25 years on. Diabetic Medicine.
- [11] McCance DR, Hadden DR, Atkinson AB, Richer DB (1989). Long-term glycaemic control and diabetic retinopathy. Lancet.