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Control Blood Sugar Levels of Children with Juvenile Diabetes Through Creative Education

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ABSTRACT

Juvenile Diabetes (JD) is type diabetes I or Insulin Dependent Diabetes Mellitus (IDDM) which occurs in childhood, is hereditary due toreactions autoimmune in pancreatic beta cells. Damage to pancreatic beta cells results in the absence of insulin, leading to hyperglycemia and its complications. People with JD need insulin injections, dietary arrangements and physical exercise as well as emotional conditions that must always be maintained so that blood glucose remains balanced and avoid threatening acute complications. Acute complications such as hypoglycemia and diabetic ketoacidosis are the biggest threat for people with JD. This study aims to obtain an overview of changes in HbA1C levels in children with juvenile diabetes before and after creative education in both the intervention and control groups. The design of this study was pretest-postpost with control group. The research sample consisted of 42 students with JD, each of which consisted of 21 for control groups and 21 for intervention groups. The results showed a difference on the value of HbA1C levels before and after the intervention in the intervention group, with p-value = 0.02. The creative application of education interventions can control blood glucose levels in children with JD, so it is recommended that these interventions be implemented especially in children with JD.

Keywords: juvenile diabetes; creative education; HbA1C

INTRODUCTION

Background

Diabetes mellitus (DM) is a chronic metabolic disease or disorder with multiple etiologies characterized by high blood sugar levels accompanied by disorders of carbohydrate, lipid and protein metabolism as a result of insufficient insulin function. Insufficiency in insulin function can be caused by disruption or deficiency of insulin production by Langerhans beta cells of the pancreas gland, or caused by the body's cells are less responsive to insulin(1). Another definition states that Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action, or both which are associated with absolute or relative deficiency of work or insulin secretion(2).

Diabetes mellitus is a chronic disease that does not cause immediate death, but can be fatal if it is not properly managed. Management of DM requires multidisciplinary management that includes non-drug therapy and drug therapy. Diabetes mellitus occurs when blood sugar levels are too high. The body uses glucose for energy, fuel to carry out various body activities. The body will convert most of the food into glucose. Blood as a carrier of glucose will deliver it to cells throughout the body. Glucose requires insulin to enter the body cells. Insulin is a hormone produced in the pancreas. The pancreas releases insulin into the bloodstream and insulin will help glucose, from food enter the body's cells and open the cell doors so that blood sugar can enter them. If the body doesn't make enough insulin or the insulin doesn't work properly, glucose can't get into the cells, so it stays in the blood. This makes blood sugar levels high, and causes hyperglycemia. If not controlled, diabetes can lead to blindness, heart disease, stroke, kidney failure, and nerve damage. Diabetes in women can cause problems during pregnancy and make them more prone to give birth to babies with birth defects(2).

Juvenile Diabetes (JD) is type I diabetes or Insulin Dependent Diabetes Mellitus (IDDM) that occurs in childhood, is hereditary due toreactions autoimmune in pancreatic betha cells[2]. Damage to pancreatic beta cells results in the absence of insulin, leading to hyperglycemia and its complications. People with JD need insulin injections, dietary arrangements and physical exercise as well as emotional conditions that must always be maintained (Website of Centers for disease Control and Prevention (CDC), 2014) so that blood glucose remains balanced and avoid threatening acute complications. Acute complications such as hypoglycemia and diabetic ketoacidosis are the biggest threat for people with JD. Data from RSHS shows that almost all people with JD come to the emergency department in a condition of ketoacidosis so that people with JD have to undergo intensive care. In addition, the emergence of chronic complications such as coronary heart disease, hypertension, stroke, nervous disorders, kidney failure, blindness[3] is also a threat to people with JD. Diabetes in childhood mostly begins to show significant signs and symptoms at the age of 14-16 years. Data obtained from the internal medicine ward of Hasan Sadikin Hospital (RSHS) Bandung, during 2013 there were 10 people with JD who had been treated with ages 9-14 years; data from the Child Endocrine Clinic from January 2013 to March 2014 there were 19 people with JD and in 2017 there was a decrease in the number of people with JD who visited to 18 people.

Purpose

Centers for Disease Control and Prevention (CDC, 2014) said that people with JD need special treatment[4], especially if people with JD are in school. Special treatment is focused on continuous care (continuity care) that must be obtained related to routine daily insulin injections, diet and balanced physical exercise, routine health checks, and emotional balance and optimal stress management. Some of the reasons for the need for special treatment for people with JD, including diabetes is a serious and fatal disease if not managed optimally, acute and chronic complications that threaten the future of people with JD, chronic disease during the transition period of life allows self-concept disorders that will affect children. looking at his future. In Indonesia, there is no model of sustainable care for people with JD. Rumahorbo (2012) developed the SESAMA model in helping people with prediabetes manage their diet and physical exercise to avoid diabetes. This model synergizes health center nurses, health cadres and people with prediabetes in managing their lifestyle so that the blood glucose balance is optimal[5, 6]. In various journals there are several models of continuous care for chronic disease patients, including diabetes patients. Freeman and Huges (2010) define continuous care based on relationship dimensions and case management dimensions[2]. Ontario defines the ongoing care of the three dimensions of sustainability information (informational continuity), ongoing case management (management contuinuity) and ongoing relationships between patients and health care professionals (relational continuity)[7]. Creative education is presented as a method of presenting information and communication in order to facilitate the delivery of information, especially for children with JD and their parents[4].

The Innovative Care for Chronic Conditions (ICCC) framework emphasizes the quality of sustainable care for people with chronic diseases involving patients and their families, communities, health teams and policy makers[8]. At the executive level, patient and family cooperation, community partners and the health team can be well developed.

This study aims to obtain an overview of changes in HbA1C levels in children with juvenile diabetes before and after creative education in both the intervention and control groups.

METHODS

Design of this study was a quasi experiment, pretest-postpost with control group. The population was children with Juvenile Diabetes in West Java. Samples were obtained at several referral hospitals (Multi Center), namely in RSHS, RSUD Dr. Soekardjo Tasikmalaya, Ciamis Hospital, Gunung Jati Cirebon Regional Hospital and RSUD 45 Kuningan with inclusion criteria aged 5-18 years. Determination of the sample for the intervention group and the control group based on the hospital cluster, namely the subjects who went to RSHS Bandung as the intervention group and the subjects who were treated at Dr. Sorkardjo Tasikmalaya, Ciamis Regional Hospital, Gunung Jati Cirebon Regional Hospital and RSUD 45 Kuningan as the control group.

Data collection was carried out before and after the creative implementation of education in the form of the delivery of serial comic books with idol figures accompanied by home visits and gatherings. The implementation was carried out for 16 weeks consisting of 4 weeks of pre-implementation in the form of preparation for the implementation of the implementation related to correspondence administration and the materials needed for the implementation of the model. Implementation was conducted for 12 weeks through home visits and during control subjects to the hospital as well as through meetings and communication via social media (WA). Outcome measurement (post intervention) was carried out after all interventions were carried out at the end of week 16. Measurement of HbA1C levels was carried out in an ISO standardized clinical laboratory.

RESULTS

The Characteristics of Children by Gender, Age and Length of Suffering from DM

The more research subjects women in the intervention group (71.4%) but on the contrary in the control group more men (52.4%). In the intervention group and control group there were more in the age group 7-13 years (52.4% in the intervention group and 57.1% in the control group). The most time to suffer from diabetes was 1-3 years in the intervention group (66.7%) while in the control group it was in the range of 4-6 years and more than 6 years (23.8%).

Table 1. Children characteristics by gender, age and length of suffering from DM

Variable	Intervention		Control	
	Frequency	Percentage	Frequency	Percentage
Gender				
1. Male	6	28.6	11	52.4
2. Female	15	71.4	10	47.6
Age				
1. 4 - 6 years	3	14.3	0	0
2. 7 - 13 years	11	52.4	12	57.1
3. 14 - 18 years	7	33.3	9	42.9
Duration of DM				
1. <1 years	3	14,3	7	33,3
2. 1 - 3 years	14	66,7	4	19,1
3. 4 - 6 years	4	19	5	23,8
4. > 6 years	0	0	5	23,8

The Characteristics of Parents by Age, Education and Occupation

Table 2. Characteristics of parents education

Education	Intervention		Control	
	Frequency	Percentage	Frequency	Percentage
1. Basic	10	47.6	6	28.6
2. Middle	4	19.1	9	42.8
3. High	7	33.3	6	28.6

Parents in the intervention group occupied higher education levels (33.3%) compared to the control group (28.6%).

Table 3. Characteristics of parents based on occupation

Work	Intervention		Control	
	Frequency	Percentage	Frequency	Percentage
1. Laborer / farmer	3	14.3	4	19.1
2. Self-employed	1	4.8	2	9.5
3. Private employees	13	61.8	11	52.3
4. PNS / TNI / Polri	4	19.1	4	19.1

The characteristics of parents based on work in both the control and intervention groups were more private employees, namely 61.8% for the intervention group and 52.3% for the control group.

The HbA1C Levels

Table 4. The of HbA1C levels of research subjects

Variable	Intervention	Control	p-value
Before Intervention			
Median	9.80	9.20	0.54
Mean ± SD	9.45 ± 1.81	9.24 ± 1.81	
After Intervention			
Median	8.50	9.10	0.82
Mean ± SD	8.67 ± 1.78	9.19 ± 1.47	

The mean value of HbA1C levels before intervention in the intervention group was 9.45 with a standard deviation of 2.56 while in the group control value of HbA1C reached 9.24 with a standard deviation of 1.81. The mean value of HbA1C after intervention was 8.67 with a standard deviation of 1.78 in the intervention group and 9.19 with a standard deviation of 1.47 in the control group.

Table 5. Differences in HbA1c levels

HbA1C	Mean	SD	SE	Mean difference	p-value	n
Intervention	-0.73	2.52	0.56	-0.774	0.02	19
Control	8.88	1.66	0.29			13

Difference in value of HbA1C levels before and after the intervention in the intervention group achieved a reduction of 0.77% while the control group experienced a reduction of 0.05% with a mean difference of 0.73% points, and p value= 0.02 was declared significant at p value<0.05. This may imply that there is a significant effect of providing creative education in the intervention group where p value= 0.02.

DISCUSSION

Creative education as part of continuity Care for patients with chronic diseases including diabetes mellitus has been widely studied in developed countries. Several researchers use different dimensions in defining sustainable care. Freeman and Huges (2010) define ongoing care based on relationship dimensions and case management dimensions[9]. The dimension of a relationship or a sustainable relationship is referred to as relationship connectivity meaning in a manner sustainable patients and health workers have a therapeutic relationship; dimension of sustainable management of cases referred to as management contuinity means built consistency and continuity of patient management including provision of information, planning nursing care, therapy programs and coordination of care needs. The results of the study reported that providing creative education as an effort in continuous care was proven to be effective in increasing patient satisfaction, lowering treatment costs, and better quality of life for patients. Various factors are associated with good sustainable care, namely continuity belief, high family control, availability of health workers and better rating providers. It is better if the decrease in continuous care is the number of visits, patient age and time to visit the hospital. Provider availability is the strongest factor in increasing the quality of sustainable care for people with JD[4].

Ontario (2013) defines the ongoing care of the three dimensions of sustainability information (informational continuity), case management of sustainable (management contuinuity) and ongoing relationships between patients and health care professionals (relational continuity)[10]. Sustainability information is defined as information becomes available about patients in all settings and settings of health services Continuity of case management is defined by the availability of standards and protocols used in patient care, accessibility of patients in obtaining services and the ease with which patients make appointments with health workers. Continuity of relationships is defined as a therapeutic relationship that exists between patients and patients. health care workers in a sustainable manner. Van Walraven's research shows the positive impact of continuous care on health conditions and increases patient satisfaction[10]. According to basic services, continuous care improves the quality of care for patients with chronic diseases. Continuous care for people with diabetes has been shown to be effective in reducing hospital visits; also has an impact on controlled diabetes, can reduce diabetes complications so that patients do not need hospital care and can improve the quality of life of patients[11].

The results of the analysis show that creative educational interventions can reduce HbA1C levels with a value of p = 0.02 (<0.05) in the intervention group. This intervention through creative education improves the knowledge and attitudes of parents and people with JD through books, training and gatherings. The procurement of comic books as an intervention for people with JD is an attraction for children which are presented in the form of a child's idol image. Messages related to diabetes, especially in implementing the pillars of diabetes control, especially in controlling blood glucose through food intake according to the amount, type and schedule of meals that are programmed and insulin injection according to type, dose and schedule as well as independent blood glucose checks. With a good understanding of children with JD, it will change their lifestyle more optimally plus the understanding of parents with good people will further strengthen the child's optimal lifestyle. Metabolic control is an important factor towards optimal quality of life for children with JD. Metabolic control assessed from controlled HbA1C levels illustrates the better the patient's blood glucose control which also reflects the adequacy of calorie intake and physical exercise of children and psychological conditions. Research by Murillo (2017) stated that the increase in HbA1C is negatively correlated with the quality of life score of people with JD[12][5]. Thus, the relatively controlled HbA1C level is an effort that must be carried out so that the quality of students with JD is more optimal.

CONCLUSION

Creative education is a form of continuous care for children with Juvenile Diabetes. Creative educational interventions are carried out through the provision of books for parents with JD, the provision of comic series reading books for students with JD, refresher training for nurses at the Outpatient Hospital where the intervention is carried out and the formation of family communities for children and adolescents with diabetes. The implementation of this creative education shows significant changes in HbA1C levels for students with JD, especially in the intervention group.

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