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The Difference of the Blood Glucose Level before and After Tracking in Diabetic Camp

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Abstract: ***Background: Diabetes mellitus (DM) is one of the most common metabolic diseases in the world, its prevalence has increased in the last decade. The Endocrinology Division of the Department of Child Health (IKA) Faculty of Medicine, Udayana University / Sanglah Hospital Denpasar has a diabetic camp program for diabetics. Its activities range from physical activity to sharing experiences of sufferers and parents with diabetes. Objective: Knowing the difference in average blood glucose levels before and after tracking in the diabetic camp held by the Endocrinology Division of the Department of Child Health Sciences (IKA) Faculty of Medicine, Udayana University / Sanglah Hospital Denpasar. Methods: This research is a cross-sectional study using a analytic design that examines differences in mean blood glucose levels before and after tracking in a diabetic camp. Results: A total of 12 samples that meet the inclusion criteria and did not meet the exclusion criteria were analyzed in this study. The sample age ranges from 1 to 12 years, with an average age of 8.17 years. A total of 9 people were female (75%). Most had good nutritional status (83.3%), each of which was only one sample that had undernutrition and over nutrition. All diabetic camp participants did not have a family history of diabetes mellitus. As many as 58.3% of participants received convensional therapy, and the rest basal bolus therapy. A total of 12 samples were assessed for average blood glucose levels prior to participating in tracking at diabetic camp activities and at the end of the tracking at diabetic camp. The results showed that the mean blood glucose levels after tracking were significantly lower than the mean blood glucose levels before tracking (136.17 mg / L vs 166.67 mg / L, p = 0.000). Conclusion: There was a significant improvement in mean blood glucose levels in children after tracking at the diabetic camp compared to before tracking.***

Keywords: children, diabetes mellitus, diabetic camp, blood glucose level.

1. Introduction

Diabetes mellitus (DM) is one of the most common metabolic diseases in the world, its prevalence has increased in the last decade. The incidence of diabetes mellitus in children in recent years has increased along with an increase in the incidence of obesity. This increase is in line with lifestyle changes, namely the consumption of foods high in carbohydrates and fats which are increased, reduced physical activity due to technological advancements that provide a variety of children's games that are less demanding of children's physical activity [1].

Based on the cause, DM is grouped into four types, namely type 1 DM, type 2 DM, other types of DM and diabetes in pregnancy or gestational. In children, the most common type of DM is type-1, there is an absolute insulin deficiency due to damage to pancreatic gland cells by an autoimmune process. The main problem of type-1 DM in Indonesia is lack of public awareness and health workers so that many patients are not diagnosed and do not get the procedure like adequate [2],[3].

The global prevalence of type 1 diabetes mellitus is estimated to be around 0.3 to 0.4%. The International Diabetes Federation (IDF) has estimated the prevalence of DM in the world since 2000, noting a large increase in these figures, with significant regional variations. Atlas of Diabetes IDF - 2015 estimates that every year around 86,000 children under the age of 15 experience type-1 diabetes worldwide, with a total of around 542,000 children with this disease. Based on the SEARCH for Diabetes in Youth study in populations under 20 The year stated that at the end of 2009 a prevalence rate of 2.22 cases / 1,000 young people was identified, representing 1.93 / 1,000 for type 1 diabetes, 0.24 / 1,000 for type 2 diabetes and 0.05 / 1000 for other forms of diabetes [4],[5],[6],[7].

Like in adults, diabetes mellitus that is not detected and treated early can cause various long-term complications, both macrovascular and microvascular. Therefore, accuracy is needed in determining the diagnosis as early as possible. In addition, proper and effective management of blood glucose control is certainly needed in the management of diabetes in children. In treating diabetes, a holistic approach is needed from an integrated health care team consisting of endocrinologists, nutritionists, psychiatrists or psychologists and DM educators [8].

Children and adolescents are at a stage where lifestyle, knowledge, skills, attitudes and characteristics of the disease change over time. Therefore, comprehensive and continuing education is needed to maintain care compliance. The Endocrinology Division of the Department of Child Health (IKA) of the Faculty of Medicine of Udayana University / Sanglah Hospital Denpasar has a diabetic camp program for diabetics. Diabetic camp is an ideal place to provide self-care education and guidance, delivered in a way that is acceptable to children and adolescents. The mission of the camp, especially for children and adolescents with diabetes, is to enable them to have a camping experience in a safe environment. An equally important goal is to enable children with diabetes to meet and share their experiences, and they learn to be more personally responsible for their own care. The educational goals for children with diabetes are the five pillars of good self-metabolism that consist of an overview of diabetes management, insulin injection procedures, nutritional planning, exercise, and disease monitoring. The pillars are applied in daily camp activities as an example for

their daily lives.

One important activity in a diabetic camp is tracking. Tracking is done with a distance of 5 km, and taken within 45 minutes to 1 hour. Diabetic camp participants take a leisurely walk while enjoying the scenery with parents. Currently there are no studies that study the effectiveness of this activity, in terms of changes in blood glucose in patients before and after following the tracking of this activity.

2. Methods

This study is an analytic study with a cross-sectional design that examines differences in mean blood glucose levels before and after tracking in the diabetic camp held by the Endocrinology Division of the Department of Child Health Sciences (IKA) Faculty of Medicine, Udayana University / Sanglah Hospital Denpasar. This study takes data from the results of the diabetic camp activities that have been carried out. The population in this study were children aged <18 years with a diagnosis of diabetes mellitus who participated in tracking activities in the diabetic camp. Sampling is done by total sampling technique, where the number of samples is equal to the total population. The sample size used was from the total population participating in the diabetic camp activity, which consisted of 16 participants.

The research data in the form of patient characteristics such as age, sex, nutritional status, family history of diabetes mellitus, and therapy were obtained from the patient's medical record. Data on patient's blood glucose level is obtained by taking data on the patient's blood glucose level before and after tracking. Data analysis was performed using SPSS 22.0 software. Data is presented in the form of narratives and tables.

This study has received information on ethical eligibility from the Ethics Committee of the Research and Development Unit (R & D) of the Faculty of Medicine, Udayana University / Sanglah Hospital Denpasar No: 683 / UN14.2.2.VII.14 / LP / 2020.

3. Results

Diabetic camp is one of the activities carried out by the Endocrinology Division of the Department of Child Health Sciences (IKA) Faculty of Medicine, Udayana University / Sanglah Hospital Denpasar. Activities in this event include physical activities to share experiences by sufferers and parents with DM.

A total of 16 childrens took part in the diabetic camp which was held for two days on 28-29 June 2019. There were four children who did not follow the tracking so that they were excluded from the study. A total of 12 samples that met the inclusion criteria and did not meet the exclusion criteria were analyzed in this study

Table 1: Characteristics of Diabetic Camp Participants

Characteristics	Frequency (N=12)	Percentage (%)
Age, years	8,17 (3,35)	
Gender		
Male	3	25
Female	9	75
Nutritional status		
Undernourished	1	8,3
Wellnourished	10	83,3
Overweight/obesity	1	8,3
Family History of Diabetes Mellitus		
No	12	100
Yes	0	0
Therapy		
Konvensional	7	58,3
Basal bolus	5	41,7

The sample age in this study ranged from 1 to 12 years, with an average age of 8.17 years. A total of 9 people were female (75%). Most had good nutritional status (83.3%), each of which was only one sample that had undernutrition and over nutrition. All diabetic camp participants did not have a family history of diabetes mellitus. As many as 58.3% of participants received conventional therapy, and the rest received basal bolus therapy.

Table 2: Comparison of Average Blood Glucose Levels Before and After Tracking

Blood Glucose Level (mg/L)	Mean	Standard Deviation	p Value
Before	166,67	18,436	0,000
After	136,17	20,893	

A total of 12 samples were assessed for average blood glucose levels prior to taking part in tracking activities and at the end of tracking activities at the diabetic camp. The results found that the mean blood glucose levels after tracking were significantly lower than the mean blood glucose levels before tracking (136.17 mg / L vs 166.67 mg / L, p = 0.000).

4. Discussion

Diabetic camp is one of the activities aimed at providing opportunities for children with DM to gather and share their experiences, and learn to take responsibility for caring for themselves. A total of 12 children in this study had followed tracking activities at the diabetic camp and were assessed as having blood glucose levels. There was a significant improvement in blood glucose levels after participating in tracking activities compared to before tracking activities at the diabetic camp. Improved glycemic control can be induced by the duration of physical activity, a balanced diet, diabetes education, and a structured environment with supervision in terms of insulin injection, monitoring blood glucose levels, and food preparation carried out during the camp [9].

Physical activity, can increase membrane permeability to increase blood flow, there by opening more capillary membranes so that insulin receptors become active and will affect blood glucose levels. If physical activity is lacking, it can cause fatty acid build up, decreased use of glucose and muscle glycogen levels. Calories that are buried in the body are the main factors causing pancreatic dysfunction. Blood glucose levels in patients with diabetes mellitus one of which is influenced by exogenous factors, namely the type and

amount of food consumed and physical activity carried out, said that physical activity affects blood glucose levels before activity and after activity. If physical activity is lacking, it can cause fatty acid build up, decreased use of glucose and muscle glycogen levels [10].

Several other studies have explained that there are improvements in glycemic control in DM patients after participating in diabetic camp activities. Most of them use HbA1c levels as an indicator of glycemic control. Research by Soenggoro et al., 9 of 28 children and adolescents who took diabetic camp in Bogor showed significant improvements in HbA1c levels within three months after participating in diabetic camp activities. One study by Carlson et al., randomized blood sugar levels in 13,267 children who participated in six camp sessions a year. The results showed a significant improvement in blood glucose control during the year, but this cannot be concluded as a causal relationship. Other studies by Semiz et al., showed no significant improvement in the mean HbA1c levels before and after diabetic camp [13],[14].

Adolescents attending diabetic camp may be familiar with the conditions they are experiencing and are more open to activities given so they have a better psychological profile and glycemic control after camp . Research by Ruzic et al., shows that modification of physical activity during the diabetic camp program can improve participants' glycemic control. There was a decrease in average blood glucose levels when on the last day of camp when compared to the first day [10],[12].

Research by Ruzic et al., showed a significant decrease in HbA1c 10 days after camp, but HbA1c increased again two months after camp. The loss of positive effects in these two months is because during this period the children enter summer vacation and do not do any organized physical activity. A decrease in routine physical activity, coupled with the absence of a program to maintain nutrient intake can eliminate the positive effects of camp.[12] An not significant decrease in results can also be caused by glucose levels or initial HbA1c which is not so high. Low blood glucose levels indicate the success of the camp to provide benefits quickly but do not ensure long-term benefits of glycemic control [11],[12],[13].

This research has several weaknesses. First, the diabetic camp was only held for two days. This duration is relatively short to provide understanding and education to parents and participants so that they can make an impact and change habits that can improve glycemic control. Second, the sample size in this study is small so it is not representative of the study population. Third, blood glucose levels when not good in assessing glycemic control and unable to assess long-term changes. This level of improvement can be influenced by nutritional intake and activities that are maintained during the camp so that it produces better blood glucose levels at the end of the activity. Future studies are expected to be able to identify factors that might influence glycemic control improvement after diabetic camp, assessment of glycemic control with better measurements such as HbA1c levels, optimal duration of diabetic camp, and types of activities in them that have the potential to provide better glycemic control results.

5. Conclusion

There was a significant improvement in mean blood glucose levels in children after tracking at the diabetic camp compared to before taking the camp.

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