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Risk factors causing Diabetes Mellitus in children and adolescent in Indonesia: A literature review

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Abstract

Diabetes mellitus in children and adolescents in Indonesia is becoming an increasingly significant health issue. Although the pediatric population reached 83 million in 2010, only a few were recorded as having TIDM according to data from the Indonesian Society of Pediatric Endocrinology (IPS). Prevalence in Indonesia has increased sevenfold in the last 10 years, reaching 28.19 per 100 million population in 2010. The main obstacles involve lack of awareness in the community and limited access to insulin. Hereditary factors also play a major role in pediatric cases. In the first stage after diagnosis, education is key in management, with emphasis on basic understanding. dietary management, insulin use, and handling medical emergencies. Insulin doses are administered empirically, with adjustments according to the phase of the disease. Collaboration with stakeholders and policy advocacy are needed to improve the quality of care for pediatric Diabetes Mellitus patients in Indonesia.

Keywords: Diabetes Mellitus; Children; Prevalence; Insulin

1. Introduction

Diabetes, a chronic condition involving an imbalance in the production and use of insulin in the body, has become a major focus in global health literature. Although it is often identified as a disease that commonly affects adults, the presence of diabetes in children is increasingly gaining serious attention. Pediatric diabetes, or childhood diabetes, is emerging as a significant challenge in the context of children's health. Considering its increasing prevalence, an in-depth understanding of the problem is crucial for effective prevention, diagnosis and treatment. Based on information from the Indonesian Pediatric Association (IDAI) in 2018, the number of children suffering from type-1 diabetes in Indonesia reached 1220 cases. The incidence of type-1 diabetes in children and adolescents has increased sevenfold, jumping from 3.88 to 28.19 per 100 million population between 2000 and 2010 [3]. According to Pulungan, data from 2003-2009 showed that in the 10-14 age group, the proportion of females with type-1 diabetes (60%) was higher than that of males (28.6%). In 2017, 71% of children diagnosed with type-1 diabetes experienced Diabetic Ketoacidosis (DKA) at first diagnosis, an increase from 2016 and 2015 which amounted to 63%. It is estimated that there are still many cases of type-1 diabetes that have not been diagnosed or have been misdiagnosed when first treated at the hospital. Individuals suffering from Type 1 Diabetes Mellitus (TIDM) cannot produce insulin according to the body's needs because the pancreatic ß-cells are damaged, so they require an external insulin supply [6]. On the other hand, Type 2 Diabetes Mellitus (T2DM) can be managed using various types of drugs, such as sulfonylureas, meglitinides, biguanids, thiazolidinediones, a-glycosidase inhibitors, peptide analogs, and amylin analogs. Sulfonylureas have the advantage of reducing blood glucose levels by increasing insulin secretion, in addition to being more affordable and able to reduce HbAIC levels by about 1%. However, sulfonylureas also have disadvantages, such as the risk of hypoglycemia and can cause kidney failure problems in people with diabetes mellitus. Based on the background described above, the aim of this study was to identify risk factors that contribute to the incidence of diabetic tract infections in children in Indonesia.

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2. Material and methods

This research is categorized as a qualitative study that uses the literature review method and adopts a descriptive analysis approach. The data used in this study came from scientific articles from national journals, obtained from the Google Scholar database using keywords such as "diabetes," "T1DM," "T2DM," and "blood glucose. "The inclusion criteria for this study were scientific articles published in the last 10 years (2013-2023). The collected data will be analyzed, and conclusions will be drawn based on the analysis.

3. Results and discussion

Based on a review of journal articles, several literature journal reviews were

Table 1 List of articles

No.	Author	Method	Result
1	Adelita et al. [1]	Case Contol	Type-1 DM cannot be cured, but the quality of growth and development of children and adolescents with type-1 DM can be maintained as well as possible with good metabolic control efforts to prevent complications. Therefore, type-1 DM management consists of five pillars, including insulin administration, nutrition, exercise, and education, supported by self-monitoring.
2	Hasanah [7]	Case Contol	The majority of 25 out of 70 children with monogenic DM are first diagnosed as type 1 DM or rarely type 2 DM. Monogenic diabetes should be suspected in children whose parents and grandparents also have DM, especially if the patient does not show typical characteristics of type 1 or type 2 DM. Stable, non-progressive hyperglycemia can be a symptom of MODY2, which is the most common type of monogenic DM.
3	Salim and Sugeng [11]	Cross Sectional	During the period 2005-2009, there were 27 medical records of Type 1 Diabetes Mellitus (T1DM) patients, of which 10 were boys (37%) and 17 were girls (63%). It was observed that the proportion of girls was almost twice that of boys, and the age of onset was mostly in the 5-10 years range.
4	Hardianto [6]	Case Contol	Individuals suffering from Type 1 Diabetes Mellitus (T1DM) experience the inability to produce insulin according to the body's needs because the pancreatic β-cells are damaged, so they require an external insulin supply. Type 2 diabetes mellitus (T2DM), on the other hand, can be treated with various types of drugs, including sulfonylureas, meglitinides, biguanides, thiazolidinediones, α-glycosidase inhibitors, peptide analogs, and amylin analogs. Sulfonylureas have the advantage of reducing blood glucose levels by increasing insulin secretion, have an affordable price, and can reduce HbA1C levels by about 1%. However, the disadvantages of using sulfonylureas are the potential to cause hypoglycemia and the risk of kidney failure, especially in elderly patients with diabetes mellitus.
5	Pulungan et al. [9]	Case Contol	The increase in Type 1 Diabetes Mellitus (T1DM) cases in children in Indonesia that is not matched by increased awareness in the community and health workers is a major challenge in the management of T1DM. Every year it continues to increase by about 3%.
6	Napitulu et al., [8]	Case Contol	During the period 2012-2016, there were 1,220 children suffering from type-1 diabetes mellitus in Indonesia. Of these, 38 pediatric cases have been treated at Hajj Adam Malik Hospital Medan. The highest age range of these cases was in the age group of 12-17 years.
7	Xue et al.	Case Contol	A child who has a family history of type 2 DM has a 5-10 times greater risk of developing type 2 DM. About 39% of children with type 2 DM have at least one

	[13]		biological parent with type 2 DM. The risk of developing diabetes mellitus can increase by as much as 40% in infants with one parent who has diabetes, and increases to 70% if both parents have diabetes.
8	Sulistyo [12]	Case Contol	Based on research conducted at Puskesmas Dander, Bojonegoro, with 30 respondents who participated in the chronic disease management program, the majority of them experienced hyperglycemic complications and had poor quality of life. Statistical analysis showed that there was a significant influence between hyperglycemic complications and respondents' quality of life.

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Based on existing data, Indonesia is classified as a developing country with a large population pyramid. In 2010, the number of children reached 83 million, or about 31% of the total population [2]. However, the Indonesian Society of Endocrinology (IPS) only recorded 1,249 Indonesian children with Type 1 Diabetes Mellitus (T1DM) from 2017-2019. The prevalence of T1DM in Indonesia increased sevenfold within 10 years, from 3.88 per 100 million population in 2000 to 28.19 per 100 million population in 2010 [8]. The same is true for children. This diabetes condition is also found in children and adolescents, as reported by Atkinson [3] and Bolla et al [4]. Although data on T1DM patients globally is still incomplete, in developed countries, its prevalence is increasing by about 3 to 4% annually in the pediatric age group, including both boys and girls. T1DM has a significant impact on life expectancy, reducing it by about 13 years in developed countries, and increasing in developing countries with limited access to insulin (Hardianto, 2020). Based on data from Aji [1] most children have cases of Type 1 DM diabetes due to family heredity as much as 66% of the majority. Researcher Adelita et al [2] said that handling steps can also be carried out by means of In the first stage after the diagnosis of type-1 diabetes mellitus (DMT1), education is provided both when the patient receives a diagnosis in the hospital and during home care. This education includes basic knowledge about T1DM, dietary management, insulin use, and first response to medical emergencies. At the time of diagnosis, families may find it difficult to receive education due to emotional distress, so the educational approach is tailored to the family's preferred pace of learning. The main focus is on practical skills to manage diabetes at home and address problems faced by families. The basic concepts taught will be revised within 4 weeks of diagnosis. Insulin dosing is done empirically, with the dose adjusted according to the phase of the disease. During the partial remission phase, the total daily dose of insulin is given less than 0.5 IU/kg/day. In prepuberty outside the partial remission phase, the insulin dose is in the range of 0.7-1 IU/kg/day. While during puberty, insulin requirements usually increase to 1.2-2 IU/kg/day.

4. Conclusion

In Indonesia, there is a surge in Type 1 Diabetes Mellitus (T1DM) cases in children and adolescents, creating significant challenges in the management of thisdisease. Although the pediatric population in Indonesia reached 83 million in 2010,only a few were recorded as having TIDM according to data from the IndonesianSociety of Pediatric Endocrinology (IPS). The prevalence of T1DM in Indonesia hasincreased sevenfold in the last 10 years, reaching 28.19 per 100 million population in2010. Similar challenges are seen in developed countries, where the prevalence ofT1DM in children is increasing by approximately 3-4% each year and has a significantimpact on life expectancy. The main obstacles in Indonesia involve lack of awarenessin the community and limited access to insulin. Data also suggests that heredity playsa large role in cases of T1DM in children. In the first stage after diagnosis, education iskey in the management of T1DM, with emphasis on basic understanding, dietarymanagement, insulin use, and handling medical emergencies. However, the educationalaapproach should be tailored to the family's level of preparedness and revised after 4weeks of diagnosis. Insulin doses are administered empirically, with adjustmentsaccording to disease phase. Amidst these challenges, further collaboration withstakeholders and policy advocacy are needed to improve the quality of care for pediatricT1DM patients in Indonesia.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Article Information

This article did not receive assistance from the government, private companies, or non-profit organizations.

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