

CHAPTER 1

INTRODUCTION

1.1 Background

Contemporary technology and lifestyle have both good and bad effects. Children at an early age are vulnerable to the impact of these advances because they are more likely to spend more time indoors with electronic devices such as mobile phones, computers, and televisions, which can reduce their chances of playing outdoors. Children rarely exercise outdoors, whereas outdoor exercise is very important for the growth of early childhood. Lack of physical activity in early childhood can increase the risk of developing diabetes mellitus. Everyone needs physical activity to live a healthy lifestyle (Septian & Izatulislami, 2021). Outdoor play and activities are very important for the physical, cognitive, and social growth of early childhood. Modernization has reduced the number of children involved in physical activity (Ningsih, 2024).

Diabetes Mellitus (DM) is one of the metabolic diseases with a prevalence that continues to increase globally, not only in adults but also in children and adolescents. There were several increases in data on diabetes mellitus in children that occurred from 2000 to 2023. In 2018, there were 1,220 children diagnosed with type-1 diabetes in Indonesia, according to data from the Indonesian Pediatrician Association

(IDAI). In 2000-2010, the incidence of DM in children and adolescents increased about sevenfold, from 3.88 to 28.19 per 100 million people. Data from 2003-2009 showed that the proportion of women with DM (60%) was higher than men (28.6%) in the 10-14 age group. In 2017, 71% of children with DM were first diagnosed with ketoacidosis. Data on KAD diabetes increased from 63 in 2016 and 2015. There was a recent increase in January 2023. A study released by the Indonesian Doctors Association (IDI) on January 31, 2023 showed that the number of diabetes cases in children increased 70-fold. Compared to the number of cases of childhood diabetes in 2010, which amounted to 0.028 per 100,000 children, and 0.004 per 100,000 people in 2000. As of January 2023, cases of diabetes in children will reach 2 per 100,000 people. Type 1 diabetes is the most common in children, while type 2 diabetes accounts for 5-10 percent of all cases of diabetes in children. As reported by IDAI, there are 1,645 children suffering from diabetes mellitus in 13 cities in Indonesia: Jakarta, Bandung, Surabaya, Malang, Semarang, Yogyakarta, Solo, Denpasar, Palembang, Padang, Medan, Makassar, and Manado. The impact of the current modern era can be seen in the use of technology in early childhood has increased, this condition is also accompanied by a lack of access to safe outdoor play areas. This can cause children to spend little time on physical activity, and can reduce children's motivation and opportunities to do activities such as running, jumping, and moving actively.

Diabetes mellitus (DM), which is accompanied by hyperglycemia, is a metabolic disease caused by abnormalities in insulin secretion, insulin action, or both. Insulin is a hormone produced by beta cells of the pancreas and consists of a series of amino acids. Under normal circumstances, when beta cells are stimulated, insulin is made and then released into the blood according to the body's needs to regulate blood glucose. The hormone glucagon, secreted by alpha cells of the pancreas, helps regulate good blood glucose regulation. The gene that codes for insulin is found on the short arm of chromosome 11 in humans. Beta cells of the islets of Langerhans produce insulin. One of the factors that stimulate beta cells to produce insulin is an increase in blood glucose levels. In addition to glucose, a number of amino acids, drugs, and glucagon made in the alpha cells of the pancreas can also stimulate beta cells. Insulin helps store amino acids, fatty acids, and sugar in the blood and also lowers their levels. One of its main metabolic functions is to increase the amount of glucose that enters certain cells in the body. Collectively, skeletal muscle cells, including fibroblasts, myocardial cells, and fat cells, account for about two-thirds of body weight. In addition to requiring normal secretory mechanisms and dynamics, glucose metabolism must proceed normally. Insulin-dependent tissues are defined as those that require insulin to take up glucose from resting muscle tissue. During muscle activity, insulin levels do not increase despite increased glucose demand. Although hepatic glycogenolysis, gluconeogenesis, and mobilization of alternative fuels, such as free fatty acids (FFAs), normally maintain stable

blood glucose levels, contracting muscle increases blood glucose uptake. In addition, physical activity increases blood flow and opens up more capillary networks, allowing insulin receptors and receptors to become more active.

Physical activity increases insulin, which lowers blood sugar levels, and converts sugar into energy. Food that enters the body of people who rarely exercise is not burned, but is stored in the body as glucose and fat (Anri, 2022). Physical activity can be beneficial for children because it can reduce the risk of heart disease, obesity, and malignancy. Playing also helps brain development, motor skills, and social interactions. Active children will learn better both in school and outside of school. Children will feel happy and confident, and they will sleep enough (Nadia P et al., 2019).

Playtime is synonymous with childhood. Physical games played by children usually involve running, jumping, or other movements. However, now there are electronic games, computers, the internet, or television that can be played just by sitting in front of them without moving (Nadia P et al., 2019). This is what causes children to do less exercise so that it can increase the risk of diabetes mellitus.

Based on the description above, researchers are interested in conducting research related to the relationship between physical activity and the risk of Diabetes Mellitus in elementary school-aged children (8-12 years).

1.2 Problem Formulation

Based on the background above, the problem of the impact of this research is as follows: "Is there a relationship between physical activity and the risk of diabetes mellitus in elementary school children (8-12 years)?"

1.3 Research purposes

1.3.1 General purpose

To determine the relationship between physical activity and the risk of diabetes mellitus in elementary school children (8-12 years)

1.3.2 Special purpose

1. Identifying physical activity in children of elementary school age (8-12 years)
2. Identifying the risk of Diabetes Mellitus in children of elementary school age (8-12 years)
3. Analyzing the Relationship between Physical Activity and the Risk of Diabetes Mellitus in Elementary School Children (8-12 Years)

1.4 Benefits of research

1.4.1 Theoretical Benefits

This study can be a source of additional information regarding the relationship between physical activity and the risk of diabetes mellitus in elementary school children (8-12 years).

1.4.2 Practical Benefits

1. For School Institutions

This research is expected to provide information and input to schools regarding the relationship between physical activity and the risk of diabetes mellitus in elementary school children (8-12 years).

2. For Respondents

It is hoped that this research can provide information to students and parents in elementary schools about the relationship between physical activity and the risk of diabetes mellitus in elementary school children.

3. For the Community

It is hoped that this research can provide information and an overview to the surrounding community regarding the relationship between physical activity and the risk of diabetes mellitus in elementary school children.