

Toxicity Effects of 2-Methoxyethanol on the Nitrite Level and Damage in Tissue of Pancreas as a Cause of Diabetes in Mice (*Mus musculus*) Balb/C

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Abstract. 2-Methoxyethanol (2-ME) is one of the plasticizer able to induce hormonal system disorders, such insulin resistance. This research was designed to determine the effect of 2-methoxyethanol on blood glucose, levels of nitrite and damage Langerhans island of mice (*Mus musculus* L.). This research was experimental research with Completely Randomized Design (CRD). Female mice strain Balb/C was used as an animal model. Samples were divided into 5 groups; Negative control (NC), KP Positive control (PC) injected intraperitoneally with Streptozotocin (STZ) dose of 30 mg/kg Body Weight (BW) daily for five consecutive days; Treated mice (T1, T2, T3 were injected intraperitoneally with 2-ME daily for ten consecutive days, at dose of 200 mmol/kg BW, 250 mmol/kg and 300 mmol/kg BW respectively). On 16th day and 21th day, mice were sacrificed using chloroform. Fasting blood glucose and nitric oxide (NO) levels were observed in this study. Liver tissue was processed histologically by paraffin method stained with hematoxylin eosin. NO in serum was observed using spectrophotometer with a wavelength of 540. The diameter of Langerhans islands was measured with light microscope. The result of this research was analyzed using the One Way Anova test ($\alpha = 0.05$) was performed to determine the effect of the treatment and Duncan test to find out the difference between the treatment groups. The result showed 2-methoxyethanol was able to increase blood glucose level, while NO was found to be decreased especially in a group treated with 200 mmol/kg BW 2-ME.

Keywords: 2-Methoxyethanol, blood glucose, nitric oxide (NO), Langerhans island, mice.

INTRODUCTION

The prevalence of the incidence of diabetes mellitus (DM) in the world reached more than 350 million people in 2013 [1-3]. International Diabetic Federation (IDF) projecting a 55% increase in the prevalence of diabetes in the world in 2035. This shows that there may be an increase in larger, especially when considering that 80% of people with diabetes live in countries with a standard of living low and middle income [1]. Indonesia is a country that was ranked fourth in the world by the number of people with DM 8.4 million people in 2000 and this figure is expected to rise to 21.3 million people by 2020 [4].

2-Methoxyethanol (2-ME) is one of the metabolites result from dimethoxy ethylphthalate (DMEP). Dimethoxy ethylphthalate is one group of phthalic acid esters is widely used as a plasticizer in the manufacture of plastics. 2-ME compound is highly flammable, colorless and volatile [4]. The use of 2-ME can also be found in companies that manufacture semiconductors, textiles, leather finishing and plastic food boxes, widely used as a solvent, especially used in paint, ink, paint thinner, smear, and coatings [5].

Alonso-Magdalena estimated that the widespread use of plastic materials for household use associated with the food packaging can explain the possibility of an increase in the epidemic of diabetes and obesity are more common