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PROPHYLACTIC ANTI-INFLAMMATORY PROPERTIES OF *MYRMECODIA PLATYTYREA* IN STZ-INDUCED RATS

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ABSTRACT

Diabetes mellitus is a metabolic syndrome associated with severe dysfunction of insulin that causes great abnormalities of glucose homeostasis. Hyperglycaemia is caused by either flaws in secretion of insulin or action of insulin, or both. Progressive loss of β-cell by T cell deformities develops both type 1 and type 2 diabetes. The main form of β-cell death in both types of diabetes is by apoptosis. The invading immune cells produce cytokines, such as IL-1β, tumour necrosis factor (TNF)-α, and interferon (IFN)-γ that induce β-cell apoptosis. This form of cell death is under the influence of hormones, growth factors and cytokines. An antioxidant, a molecule that inhibits the oxidation of other molecules, may be the answer to inhibit oxidation and inflammation. *Myrmecodia platytyrea*, an epiphytic plant known by its local name, sarang semut (Rubiacea family) displayed encouraging antioxidant activity due to its high phenolic constituent. Therefore, this study was designed to determine the activity of *M. platytyrea* methanolic tuber extract (MPMTE) as prophylaxis of T2DM. The efficacy of the prophylactic treatment of MPMTE (100, 200 and 400 mg/kg, p.o.) were determined by measuring inflammation biomarkers of strepzotocin (STZ)-induced rat model. STZ (45 mg/kg, i.p.) was administered prior to 14 days of treatment with MPMTE, daily. Five days after STZ induction, blood was collected via cardiac puncture and further analysed by using flow cytometry for the lymphocyte subpopulation (T and NK cells) and ELISA Kit for cytokine levels (insulin growth factor and TNF-α). Results showed that CD3 and CD4 were reduced significantly ($p<0.05$) in STZ-induced rats treated with MPMTE (100-400 mg/kg, p.o.) compared to untreated STZ-induced rats. However, only STZ-induced rats given 100 and 200 mg/kg (p.o.) of MPMTE showed an increase ($p<0.05$) of CD8 compared to untreated STZ-induced rats. CD45 was only reduced in STZ-induced rats given 200 mg/kg (p.o.) whereas reduction of CD161 was observed in STZ-induced rats given 100 mg/kg (p.o.) compared to untreated STZ-induced rats. Interestingly, TNF-α were reduced and IGF were increased significantly ($p<0.05$) in STZ-induced rats treated with MPMTE (100-400 mg/kg, p.o.) compared to untreated STZ-induced rats. In conclusion, MPMTE has antioxidant and anti-inflammatory properties that may reduce the incidence and/or delay the onset of T2DM.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Diabetes mellitus is a complex metabolic syndrome associated with severe dysfunction of insulin that result in great abnormalities of glucose homeostasis along with lipid metabolism, and this phenomenon has greatly affected people worldwide (Sathishsekar & Subramanian, 2005). Diabetes is categorized by hyperglycaemia caused by flaws in secretion of insulin, action of insulin, or both (American Diabetes Association, 2010).

Type 1 diabetes is classified as an autoimmune disorder correlated with continuous and regular destruction of β-cell. Type 1 diabetes is lacking of insulin due to complete destruction of pancreatic β-cells and treatment of this disorder requires insulin therapy (Gleissner et al., 2007). β-Cell auto antigens, dendritic cell, macrophages, T lymphocytes, and B lymphocytes are involved in the pathogenesis of autoimmune diabetes. β-cell auto antigens are secreted from β-cell by cellular turnover and are presented to T helper cells after being processed by antigen-presenting cells. Dendritic cells and macrophages are the first cell types known to infiltrate the pancreatic islets (Yoon & Jun, 2005).