UNIVERSITI TEKNOLOGI MARA (UiTM)

EFFECTS OF ENDOPHYTIC *ASPERGILLUS* SP. STRAIN HAB10R12'S FRACTIONS (R1 AND R2) ON TNF-α INDUCED INSULIN RESISTANCE IN DIFFERENTIATED 3T3-L1 ADIPOCYTES

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ABSTRACT

Insulin is responsible for regulation of glucose uptake and circulating free fatty acids (FFA). When there is insulin resistance, there will be an increased in circulating FFA concentrations and fat accumulation that impede insulin mediated glucose in skeletal muscle and elevated glucose production in liver. This will lead to the development of metabolism problem including Type 2 diabetes which can cause other serious problem such as cancer. Therefore, it is important to find a compound that able to reverse insulin resistance. There is growing evidence that bioactive substance produced by microbial endophytes have applicability in medicine, agriculture and industry . So, the aim of this research is to study the effect from fraction of endophytic *Aspergillus* sp. strain HAB10R12 (R1 and R2) on normal 3T3-L1 adipocytes and insulin resistance 3T3-L1 cell induced by TNF-α. Results in MTT Assay test shown that R1 and R2 treatments caused no cytotoxic effects to the normal 3T3-L1 cells and no IC_{50} value observed in the data. Besides, in glucose uptake test, when compared with the untreated insulin resistance cell, there was in increased in percentage of glucose uptake by insulin in the insulin resistance cell treated both R1 and R2 treatments from the lowest concentration up to 0.01 μg/ml.

CHAPTER 1

INTRODUCTION

Insulin resistance is a condition by which the tissues display a weaker-than expected response to insulin. Insulin plays a major role in human body system. It is the one that is responsible to regulate glucose uptake and circulating free fatty acids (FFA). It decreases lipolysis in adipose tissue thereby reducing FFA efflux from adipocytes. In addition, insulin also inhibits gluconeogenesis by reducing key enzyme activities and stimulates the translocation of the glucose transporter 4 to the plasma membrane. So, when there is an existence of insulin resistance, there will be an increased in circulating FFA concentrations and fat accumulation that impede insulin mediated glucose in skeletal muscle and elevated glucose production in liver (Zeyda and Thomas, 2009). Finally, this will lead to development of Type 2 diabetes. Besides, it also appears to be the most common finding especially in individuals with obesity and glucose intolerance person (Gilcampos, 2004). Obesity and insulin resistance was recognized as leading causes of major health issues, particularly Type 2 diabetes and other metabolic syndrome.

So, obesity is characterized by an increased in fat accumulation. It is an epidemic of 21st century (Ramachandran and Snehalatha, 2010). Many factors involved in the development of epidemic obesity. One of them is due to the rapid development in economic which gives more chance for people to buy fast foods