UNIVERSITI TEKNOLOGI MARA

PHYTOCHEMISTRY AND ANTIDIABETIC ACTIVITY OF *DERRIS ELLIPTICA* METHANOLIC LEAVES EXTRACT

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ABSTRACT

Derris elliptica is a medicinal plant from the Fabaceae family, a species of leguminous plant and this plant locally known as 'akar tuba'. This study aims to investigate the phytochemical constituents and also anti-diabetic activity of *Derris elliptica* methanolic leaves extract (DEME) on streptozocin (STZ) induced diabetic sprague dawley rats. Maceration technique and chromatographic technique were performed for extraction and identification of phytoconstituents respectively. Fractions from column chromatography were observed by Thin layer chromatography (TLC) with various solvents systems. Acute oral toxicity studies were assessed by 2 g/kg body weight (bwt) in normal rats. The anti-diabetic activities were investigated in STZ (45 mg/kg) intraperitoneally induced rats. Diabetic rats were orally administered with standard glibenclamide (10 mg/kg bwt), DEME (200 mg/kg bwt and 400 mg/kg bwt) for 14 days. Blood glucose, body weight, biochemical parameters and histology of pancreas, liver and, kidney were analyzed. Preliminary phytochemical test revealed the presence of carbohydrates, alkaloids, flavonoids, terpenoid and tannins. TLC with solvent system n-hexane and ethyl acetate at ratio 8:2 identified a pure compound (**9**). The ^{1}H-NMR spectrum indicated as ceramide analogue structures. No toxicity or mortality was observed. Treatment with DEME in STZ induced rats significantly ($P<0.001$) improved the bwt and exhibited antihyperglycemic effect. Serum insulin in glibenclamide and DEME 400 mg/kg significantly increased ($P<0.05$). Furthermore, aspartate aminotransferase, alanine aminotransferase, lactic acid dehydrogenase and total bilirubin were significantly reduced. Total cholesterol decreased significantly in DEME 200 mg/kg ($P<0.01$) and DEME 400 mg/kg ($P<0.05$). DEME & glibenclamide treatment indicated cytoprotection and reveals the up-regulation of insulin secretion with antihyperglycemic activity. In conclusion, DEME could be a promising therapeutic agent for the management of diabetes mellitus.

ACKNOWLEDGEMENT

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

Traditional medicine has gained acceptance and herbal medicine products are growing worldwide. In the United States population, 40% of adults used complementary and alternative medicine (CAM) therapy (Barnes *et al.*, 2008; W. I. Lu, & Lu, 2014). CAM is commonly used in developed countries where the health system structure is typically well developed, e.g. North America and many European countries. China has been practicing CAM over 5,000 years and 55.8% of the Chinese herbal medicine is used for preventive immunization and cancer (McQuade *et al.*, 2012a; Jong Hun Lee *et al.*, 2013). Ayurveda medicine is another alternative medicine that has been practiced in India for 5,000 years in health care, wellness applications and medical treatment. There are 785,185 registered ayurveda, yoga, naturopathy, unani, siddha and homeopathy practitioners in India. Similarly, other Asian countries such as Singapore and the Republic of Korea, where the conventional health care system is well established, 76% and 86% of the respective populations still commonly use traditional medicine has been approved as an alternative for of health care (WHO, 2013; Sen & Chakraborty, 2017). The prevalence of the Malaysian population used Traditional and Complementary Medicine (TCM) have been reported 69.4% to 71.2 % (WHO, 2013; Johny, Cheah and Razitasham, 2017).

The use of complementary and alternative medicine is rising among patients with chronic diseases in developing countries. The rising use of CAM in the management of diabetes is an emerging public health concern given the potential adverse effects, drug interactions and benefits associated with its use. There are 387 million people have been diagnosed with diabetes and it is expected to increase to 592 million by 2035 (International Diabetes Federation, 2014). Diabetes is a major public health concern in Malaysia and the prevalence of type 2 diabetes has escalated to 20.8% in adults above the age of 30 affecting 2.8 million individuals (Hussein *et al.*, 2015). In 2015 it was estimated that there were 415 million people with diabetes aged 20 – 79 years, 5.0 million deaths attributable to diabetes (Ogurtsova *et al.*, 2017).

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