

Research Article

T. M. Thant, N. S. Aminah*, A. N. Kristanti, R. Ramadhan, H. T. Aung, Y. Takaya

Antidiabetes and Antioxidant agents from *Clausena excavata* root as medicinal plant of Myanmar

<https://doi.org/10.1515/chem-2019-0056>

received November 27, 2018; accepted February 27, 2019.

Abstract: All around the world, patients with diabetes and the prevalence of its disease are currently growing. Due to these side effects of oral hypoglycemic agents and oxidative stress in complicating diabetes, there is growing interest in drugs, which possess dual function as both type II diabetes mellitus treatment and oxidative stress treatment. The objective of this research is to search effective antidiabetes and antioxidant bioactive compounds from the Myanmar medicinal plant *Clausena excavata*. The root part of *C. excavata* was successfully extracted with 95% ethanol and followed by column chromatographic separation technique. The structure of isolated pure compounds was elucidated by using methods of spectroscopic such as UV-Vis, IR, NMR and HRFABMS spectrometry. The α -glucosidase inhibition assay was performed against baker's yeast and rat intestine (sucrose and maltase) α -glucosidases. The activity of isolated compounds' antioxidant was measured by using DPPH assay. Among the tested enzymes, the two isolated compounds, which were dentatin (**1**) and heptaphylline (**2**), exhibited highest inhibitory on maltase enzymes with IC_{50} values 6.75 and 11.46 μ M; as positive control, acarbose (IC_{50} , 2.35 μ M) was utilized. Moreover, scavenging activity was found to be present upon seeing

the result of antioxidant activity investigation of (**1**) and (**2**) (IC_{50} values 2.66 and 1.55 mM), where ascorbic acid (IC_{50} 0.012 mM) was used as standard. Both compounds showed their antidiabetic and antioxidant activity with different fashion, especially exhibited strongest activity against on maltase α -glucosidase.

Keywords: *Clausena excavata*; dentatin; heptaphylline; α -glucosidase; antidiabetes; antioxidant; DPPH.

1 Introduction

In general, diabetes is a chronic metabolic disorder that could be serious and lethal. It is characterized by relative or absolute insufficiencies which occurs either when the body cannot effectively use the insulin (a hormone that regulates blood glucose) it produces, or when the pancreas does not produce adequate insulin [1]. World Health Organization (WHO) recognized three types of diabetes mellitus such as, (i) type 1 diabetes (insulin-dependent) (ii) type 2 diabetes (non-insulin-dependent) and (iii) gestational diabetes. One of the most frequent effects of uncontrolled diabetes is raised blood glucose. It could lead to fatal damages to the blood vessels, nerves, eyes, kidneys and eventually the heart [1, 2]. Diabetes is not only lethal but it is also the major cause of blindness, heart attacks, kidney failure, strokes, gangrene, and neuropathy especially for adults [3]. The patients of diabetes who also live with the prevalence of the disease are growing in the whole world. There were 422 million diabetic adults (or about 8.5% of the world's population) in 2014. The number increased highly compared to the year of 1980 with 108 million of diabetic adults (4.7% of the world's population) [4].

One inevitable consequence of Type 2 Diabetes Mellitus (T2DM) is Hyperglycemia. The symptom is marked by high level of blood sugar and it is said to be the most destructive effect associated with T2DM. The high level of blood sugar stimulates glucose auto-oxidation so that free radicals could be formed. The presence of free

*Corresponding author: N. S. Aminah, Dept. of Chemistry, Fac. of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia, E-mail: nanik-s-a@fst.unair.ac.id

T. M. Thant, Ph.D. Student of Mathematics and Natural Sciences, Fac. Of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia; Dept. of Chemistry, Mandalay Degree College, Mandalay, Myanmar

A. N. Kristanti, R. Ramadhan, Dept. of Chemistry, Fac. of Science and Technology, Universitas Airlangga, Komplek Kampus C UNAIR, Jl. Mulyorejo, Surabaya, Indonesia

H. T. Aung, Dept. of Chemistry, Mandalay University, Mandalay, Myanmar

Y. Takaya, Fac. Of Pharmacy, Meijo University, 150 Yagotoyama, Tempaku, Nagoya, 468-8503, Japan