



Anti-Diabetic and Free Radical Scavenging Activity of Phytochemicals from *Caesalpinia bonducella*

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Abstract

Diabetes mellitus is a metabolic disease resulted with high blood glucose levels due to oxidative stress that leads to many complications. Natural compounds derived from herbal plants are alternative source that increasing globally in the process of diabetes drug development. The present study investigates the potential of plant natural compounds for its therapeutic capability to treat diabetic mellitus. Phytochemicals were extracted and purified from seeds of the plant *Caesalpinia bonducella*. The functional group in *Caesalpinia bonducella* was confirmed by UV-VIS and FTIR spectroscopic technique. The seed extract's in vitro antioxidant properties in various concentration (0.25 to 1 g/mL) were carried out against the DPPH and H₂O₂ onion radical scavenging assay. In vitro studies of anti-diabetic activity were also evaluated by inhibiting key enzymes that are involved in glucose metabolism such as alpha amylase. The seed extract was found to inhibit the enzyme responsible for glucose metabolism and so maximum inhibition was observed in 0.25 mg/mL and the compound was found to be highly reactive against free radicals. In the DPPH assay, the plant seed extract has a maximum inhibitory activity of 92.04% at high concentration. Additionally, for the H₂O₂ scavenging test, the inhibition of the plant seed extract at 0.75 g/mL concentration was 88.3%. This suggests that the plant's phytocompounds may offer therapeutic benefits for the treatment of diabetes and conditions linked to oxidative stress. In vivo investigations of the study's findings are further necessary to validate the phytocomplex's efficacy and open the door to the creation of cutting-edge treatments for antioxidants and diabetes.

Keywords: Anti-diabetic activity, *Caesalpinia bonducella*, enzyme inhibition, free-radical scavenging action.

Introduction

Diabetes mellitus (DM) a complex disorder affecting the overall metabolism resulting in abnormal lipid profile, impaired insulin, impaired secretion of antioxidant enzymes and a rise in reactive oxygen species (ROS) due to an intensification of oxidative stress (Seuring *et al.*, 2015). Oxidative stress when stimulated by the production of free radicals during hyperglycaemia, it then contributes to the development and progression of diabetes (Shamran & Jaffat, 2020). Diabetes with ROS generation is a main factor for dysregulation of endothelial cell functions with impairments in vasodilation and angiogenic properties (Kolluru *et al.*, 2012). In patients with increasing levels of glucose together with dyslipidaemia may develops microangiopathies with oxidative stress (Fadheel, 2018).