

# *In vitro* antioxidant and anticancer activities of *Clinacanthus nutans* extracts

Joyce Hui Yie Phung<sup>1</sup>, Isabel Lim Fong<sup>1\*</sup>, Heng Yen Khong<sup>2</sup> and Weng Kit Ban<sup>1</sup>

<sup>1</sup> Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak, Kota Samarahan 94300, Sarawak, Malaysia

<sup>2</sup> Faculty of Applied Sciences, Universiti Teknologi MARA, Kota Samarahan 94300, Sarawak, Malaysia

## ABSTRACT

**\*Corresponding author:**  
Isabel Lim Fong  
[flisabel@unimas.my](mailto:flisabel@unimas.my)

**Received:** 28 September 2020  
**Revised:** 25 January 2021  
**Accepted:** 5 February 2021  
**Published:** 27 December 2021

**Citation:**  
Phung, J. H. Y., Fong, I. L.,  
Khong, H. Y., and Ben, W. K.  
(2021). *In vitro* antioxidant and  
anticancer activities of  
*clinacanthus nutans* extracts.  
*Science, Engineering and  
Health Studies*, 15, 21050014.

*Clinacanthus nutans* (CN), from the Acanthaceae family is a medicinal plant widely used in Thailand and Malaysia. CN is commonly used as a treatment of inflammation, cancer, and herpes virus infection. This study aimed to determine the antioxidant activity and anticancer properties of CN leaves extracts on human colorectal cancer cell lines, HCT 116 and HT-29. In this study, CN leaves powders were extracted in methanol, chloroform, and acetone at different durations. The crude extracts were assessed for total phenolic content (TPC), total flavonoid contents (TFC), 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity and MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) tetrazolium reduction assay. The extract using acetone showed with the highest TPC. The highest total flavonoid content was the methanol extract. The DPPH radical scavenging activity, IC<sub>50</sub> of methanol extract was 19.67 µg/mL and exhibited the most efficacious antioxidant property among the others. The 24-hour methanol extract showed the most promising results on MTT assay. Therefore, CN methanol extract is a promising candidate to proceed in other anticancer studies such as cell cycle arrest and apoptosis assays.

**Keywords:** *Clinacanthus nutans*; colorectal cancer; anticancer; antioxidants; phenolic; flavonoid

## 1. INTRODUCTION

Cancer causes the second highest mortality in the world. In 2018, it was estimated to result in 9.6 million deaths (WHO, 2019). Colorectal cancer is the third most fatal cancer and the fourth most diagnosed cancer worldwide (Rawla et al., 2019). According to the Malaysian national cancer registry report 2012-2016, colorectal cancer was the most common cancer in male and the second most common in female (Azizah et al., 2019). It is possible to prevent colorectal cancer progression if early polyps were detected. Nonetheless, early detection of polyps is not routinely performed unless the patient has underlying hereditary history of colorectal cancer. This is commonly treated with surgery and in the advanced stage, a single

chemotherapeutic drug, 5-fluorouracil (5-FU) would be routinely used or combined with adjuvants like avastin and oxaliplatin (Sheikh et al., 2017a; Cutsem et al., 2015). Undetected polyps usually lead to formation of adenomas and carcinomas before the late stage of metastasis leading to high mortality risk (Sheikh et al., 2017a).

Many studies have reported that increased levels of intracellular free radicals such as reactive oxygen species (ROS) and reactive nitrogen species (RNS) triggered cancer formation (Yong et al., 2013). ROS and RNS are normally found in the human body as they are by-products of metabolism in normal cells (Yong et al., 2013). These ROS and RNS damage the normal cells, especially DNA, resulting in genomic instability and induce cancer initiation (Yong et al., 2013). Many medicinal plants have been reported to