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DIFFERENTIAL CYTOTOXICITY OF ETHYL ACETATE EXTRACT OF MALAYSIAN MARINE ENDOPHYTIC FUNGUS (MPL2) AGAINST HUMAN BREAST CANCER CELL LINES

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TABLE OF CONTENTS

ABSTRACT

Endophytes are microorganisms ranging from bacteria to parasitic angiosperms which live within healthy tissues of plants without causing harm. There is increasing evidence that had demonstrated endophytes as a rich source of natural, novel bioactive compounds against cancers. Exploiting on the vast majority of unexplored Malaysian endophytes that live within the marine plants, the present study assessed the cytotoxic potential of ethyl acetate extracts of endophytic fungal (MPL2) extract isolated from the leaves of *Sonneratia* sp. ("*Perepat*"). The endophytic fungus MPL2 was first examined using gross observation and environmental scanning electron microscope (ESEM). The fungal culture was extracted with ethyl acetate and concentrated using rotary evaporator. MCF7 (ER positive breast cancer cells) and MDA468 (ER negative breast cancer cells) were treated with the MPL2 etheyl acetate extract (0.01 - 100 µg/mL) for 72 h. The Sulforhodamine B (SRB) assay was performed and data generated was used to plot dose-response curve from which the IC_{50} (concentration that inhibit 50 % cells population) was obtained. The present study found *Sonneratia*-derived MPL2 to exhibit modest cytotoxic activity against both MCF7 and MDA468 (Mean IC_{50} = 30.0 ± 9.8 µg/mL and 57.1 ± 8.6 µg/mL, respectively). Its cytotoxicity was 1,000 times less potent when compared to that of paclitaxel, the positive control (Mean IC_{50} = 0.03 ± 0.01 µg/mL and 0.02 ± 0.005 µg/mL against MCF7 and MDA468, respectively). Its cytotoxicity was 4 times less potent when compared to that of tamoxifen, another positive control (Mean IC_{50} = 7.4 ± 6.8 µg/mL against MCF7). The cytotoxic potential of this marine endophytic fungus against other cancer types should be explored in future studies. Potential new bioactive compounds derived from MPL2 should also be evaluated.

CHAPTER 1

INTRODUCTION

1.1 Background of study

Breast cancer, a growth of abnormal tissues in the breast, is life threatening as it can disturb normal breast tissues and invade surrounding tissues as well as organs (Chan, 2009). Breast cancer is the leading cancer among women in the world (WHO, 2015a). In 2012, about 522,000 women around the world died of breast cancer (Cancer Research UK, 2015a). In the United States alone, about 220,000 women are diagnosed with breast cancer and over 40,000 died of this deadly disease annually (National Breast Cancer Foundation, 2015). In Malaysia, breast cancer is the most common cancer that affects mainly women (Omar & Tamim, 2007).

The current treatments for breast cancer include surgery, radiotherapy, chemotherapy, hormonal therapy and targeted therapy (National Cancer Institute, 2015a). Chemotherapy, in particular, is important against advanced stage cancer because it slows down and controls the spread of cancer cells, relieves symptoms and enhances quality of life (Cancer Australia, 2015a). Chemotherapy uses anticancer drugs (cytotoxic agents)