



Potential of Indonesian Herbal Medicine, *Phaleria macrocarpa* (Scheff.) Boerl, for Targeting Multiple Malignancy Signaling Pathways: An Introductory Overview

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Authors' contributions

This work was carried out in collaboration between all authors. Authors AF, HMBB, LS and DK designed the study and wrote the first draft of the manuscript. Authors AF, MZA and FFW supervise the study and the literature searches. This study was supported by the Academic Leadership Grant (ALG) 1-1-6 Universitas Padjadjaran 2015, Bandung, Indonesia for authors AF, MZA and FFW. All authors read and approved the final manuscript.

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ABSTRACT

A wide variety of natural compounds have been recognized for targeting multiple malignancy signaling pathways and inducing apoptosis in various cancer cell lines from different origins. The chemical compositions of those substances present in plants contribute to their significant biological and medicinal value. In this review, we summarized our current findings and knowledge

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of bioactive compounds isolated from the Indonesian medicinal herb, *Phaleria macrocarpa* (Scheff.) Boerl, also known as Mahkota Dewa (MaDe) that originated from Papua province. A growing body of evidence from several countries suggests that the plant possesses potential for cancer therapy and chemoprevention. Exploring its mechanism in targeting multiple malignancy signaling pathways will provide valuable information for possible clinical applications in cancer management.

Keywords: Indonesian herb medicine; *Phaleria macrocarpa*; signaling pathways.

1. INTRODUCTION

Indonesian tropical forests are abundant in natural resources; it covers approximately 143 million hectares, and about 80% of the world's medicinal plants are present there [1]. It is the second richest in terms of biodiversity after the Brazilian Amazon forest. It is estimated to harbor approximately 28,000 plant species, which 1,845 of them have been identified as medicinal plants [2]. According to the Indonesian Agency of Drug and Food Control, 283 species of those medicinal plants have been officially registered for their medicinal usage and have been used by the Indonesians as traditional medicines. A total of 180 of these species are from the tropical forests, and 49% of them grow in the low-altitude areas [3].

In recent years, the demand of potent and safer compounds for cancer therapy and chemoprevention has been increasing. Natural bioactive compounds derived from plants and

their synthetic derivatives are expected to play an important role in the creation of novel and improved therapies for cancer management, both as monotherapy and in combination with conventional anticancer drugs. *Phaleria macrocarpa* (Scheff.) Boerl or *Phaleria papuana* Warb var. *Wichnannii* (Val) Back, commonly known as Mahkota Dewa (MaDe), is a medicinal plant that originated in Papua (Fig. 1) [4]. It is popular among Indonesians due to its wide array of medicinal properties. *In vitro* and *in vivo* studies have demonstrated that the fruits and leaves extracts of MaDe to have anti-hyperlipidemic [5], anti-hyperglycemic [6,7], antioxidant [8], anti-inflammatory [9,10], antibacterial and -fungal [11], and anti-atherosclerotic effects [12]. Moreover, its potency as an anticancer agent has been known for generations. Many studies have been conducted about the extraction, isolation, and characterization of MaDe's bioactive constituents (compounds) as potential sources of anticancer agents [13-16].

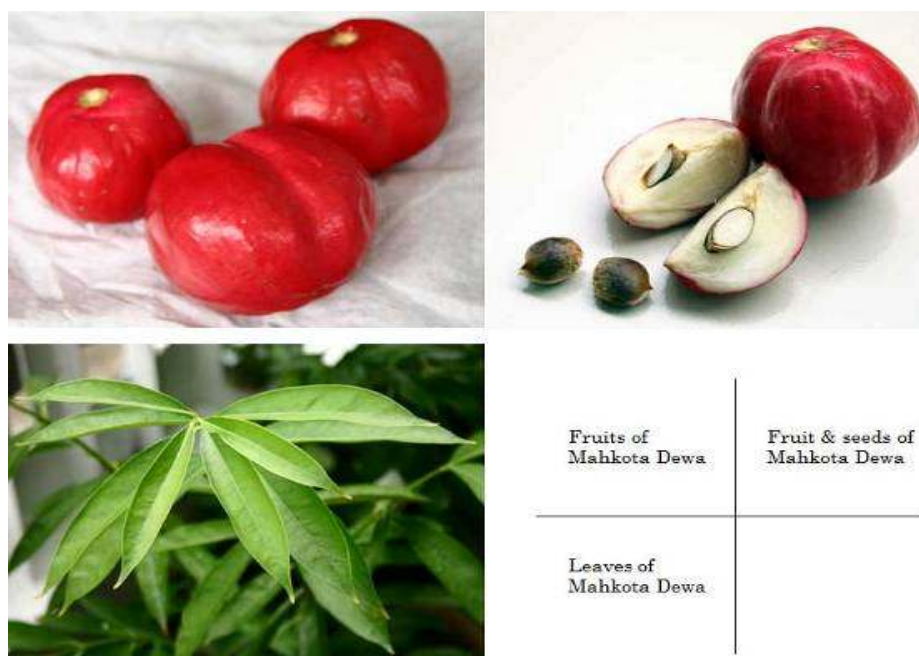


Fig. 1. Fruits, stems, seeds, and leaves of Mahkota Dewa (MaDe)