

Chapter 5

Assessment of Anticancer Properties of Thai Plants

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ABSTRACT

Cancer, a critical health concern, necessitates safer, more effective treatments. This chapter explores the anticancer potential of traditional Thai plants, which, despite being underresearched, show significant promise. It focuses on bioactive compounds and their efficacy against various cancer types. The chapter categorizes these plants based on their active components and reviews both laboratory and animal studies to understand the underlying mechanisms involved in inhibiting cell growth, inducing cell death, and preventing tumor blood vessel formation. Clinical trials supporting these findings are also highlighted. Given their potential to improve or innovate cancer treatments, Thai plants present encouraging prospects. However, further research is essential to confirm the safety and efficacy of these approaches. These studies suggest that Thai plants could lead to the development of innovative anticancer drugs, signaling potential significant advancements in cancer therapy.

INTRODUCTION

Cancer represents a major health challenge worldwide, and its prevalence is increasing (R. Wang et al., 2024). In Thailand, cancer is the leading cause of death after cardiovascular disease, underscoring its impact on public health. According to data from 2020, the incidence of cancer in Thailand was 0.6%, with 190,636 new diagnoses reported within the year. Tragically, this led to 124,866 deaths, highlighting the urgent need for effective prevention, early detection, and treatment strategies to combat this devastating disease (Vichapat et al., 2023). This disease is characterized by uncontrolled cell growth, leading to malignant tumors that can metastasize and spread to other parts of the body (Awujoola et al., 2024). Despite advances in medical science, treating cancer remains complex and often requires a combination of surgery, chemotherapy, and radiation therapy (Xu et al., 2024). While these treatments can be effective, they often cause severe side effects and do not always guarantee a cure (Flores et al., 2024).

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The complexity of cancer, which varies significantly among individuals due to factors such as genetics, environmental influences, and lifestyle, further complicates the development of universal treatment strategies (Felici et al., 2024). Challenges in current cancer treatment include chemotherapy resistance, relapse after treatment, and the nonspecificity of drugs, which may harm normal cells in addition to cancer cells (Sadida et al., 2024). These challenges have spurred an ongoing search for more effective, targeted, and less toxic therapeutic options, highlighting the need for continued innovation in cancer treatment methodologies (Patwekar et al., 2024).

The exploration of medicinal plants for cancer therapy has opened a new frontier in the quest for more effective and safer cancer treatments (R. Wang et al., 2024). Historically, plants have been the foundation of many traditional medical treatments and continue to play a vital role in modern pharmacology (Zhang et al., 2024). The natural bioactive compounds of these plants provide a vast resource for novel drug discovery (Yingngam, 2023). Unlike some conventional chemical agents, certain plant-derived compounds show potential for targeting cancer cells more selectively, possibly reducing damage to healthy cells and minimizing side effects (Feng et al., 2023). Many of these compounds have demonstrated anticancer effects, such as inducing apoptosis in cancer cells, inhibiting tumor growth, and preventing metastasis (Devarajan et al., 2023; Okem et al., 2023; Wei et al., 2023). The efficacy of these plant-based compounds has been demonstrated in various *in vitro* and *in vivo* studies, and some have progressed to clinical trials (Fotsing et al., 2023; Salehi et al., 2023; Yingngam, Brantner, et al., 2021). Integrating these natural compounds into mainstream cancer therapy could revolutionize the treatment landscape, offering a complementary or alternative approach to traditional treatments (Mali, 2023; Tao et al., 2023). Therefore, medicinal plants represent a promising and largely untapped reservoir of potential anticancer agents (Tian et al., 2024).

Thailand, with its rich biodiversity, is home to an abundance of medicinal plants, many of which have been integral to traditional Thai medicine for centuries (Sukkasem et al., 2024). These plants form a crucial part of the country's cultural heritage and traditional healthcare system (Kapol & Nootim, 2023). Notably, Thai medicinal plants are recognized for their diverse pharmacological properties, including potential anticancer effects (Saengha et al., 2023). Scientific studies have highlighted the promising anticancer activities of compounds extracted from plants such as *Morinda scabrida* Craib, *Bauhinia strychnifolia* Craib, and *Limnophila aromatica* (Lam.) Merr. (Phonghanpot & Jarintanan, 2021; Saelim et al., 2024; Yingngam, Brantner, et al., 2021). These plants are rich in bioactive compounds such as flavonoids, alkaloids, and terpenoids, which are renowned for their therapeutic properties, including anti-inflammatory and antioxidant effects (Phonghanpot & Jarintanan, 2021; Yingngam, Brantner, et al., 2021). The traditional use of these plants in Thai medicine provides invaluable ethnobotanical insights and lays the groundwork for scientific research into their anticancer properties. The systematic study of Thai medicinal plants not only aids in the global fight against cancer but also helps preserve and validate Thailand's traditional knowledge (Panyajai et al., 2024). This overview paves the way for a more detailed exploration of the specific anticancer properties of Thai plants, their bioactive compounds, and the potential they offer in revolutionizing cancer therapy.

The aims of this chapter are as follows:

- 1) To explore the ethnobotanical background of Thai plants. This includes investigating the historical and cultural significance of Thai medicinal plants, particularly in the context of traditional oncological practices. Understanding the traditional uses and beliefs surrounding these plants provides valuable insights into their potential therapeutic applications.

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